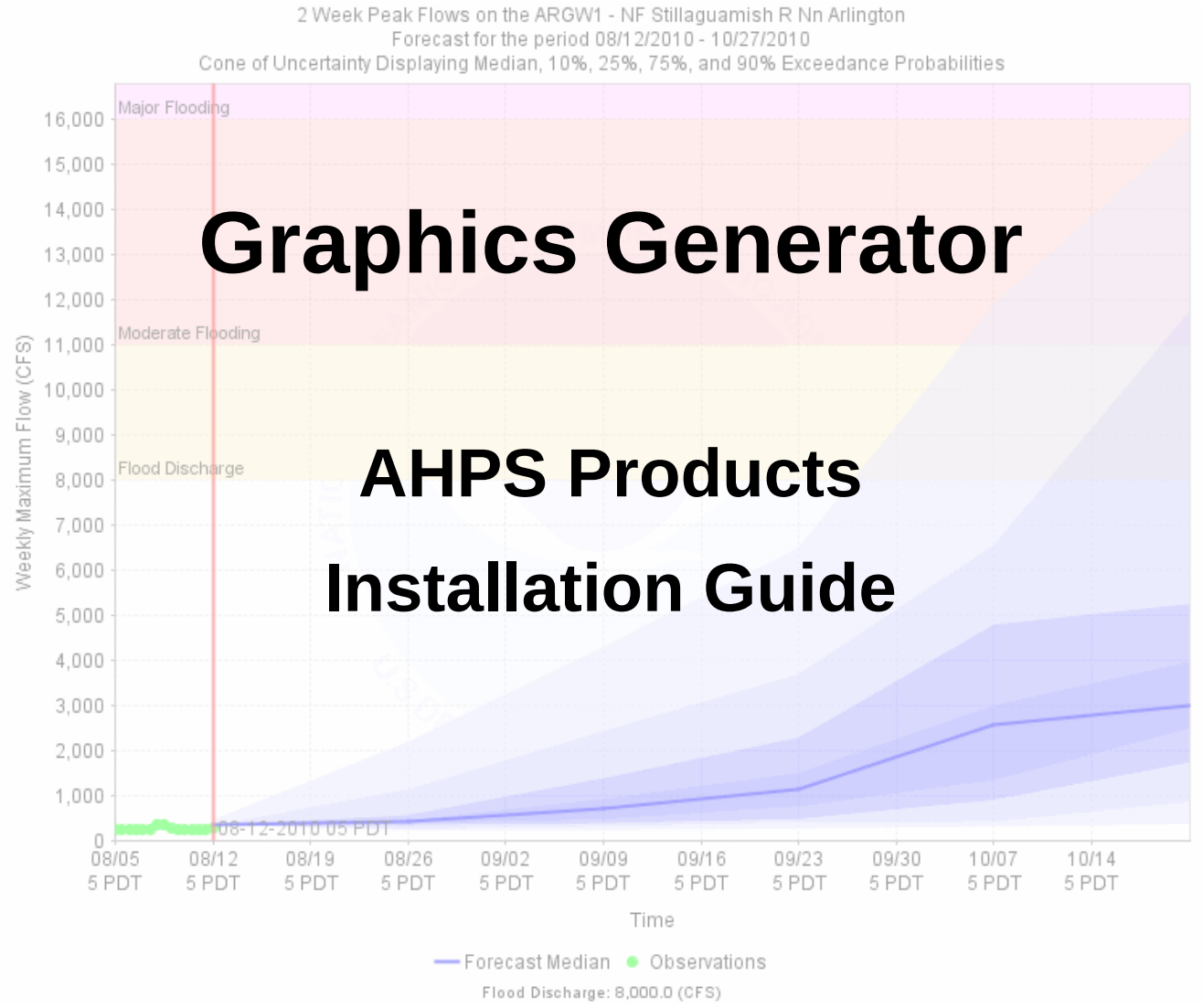


Graphics Generator

AHPS Products

Installation Guide

Version: OHD-CORE-CHPS-4.4.a

Release Date: 16 May 2016

Table of Contents

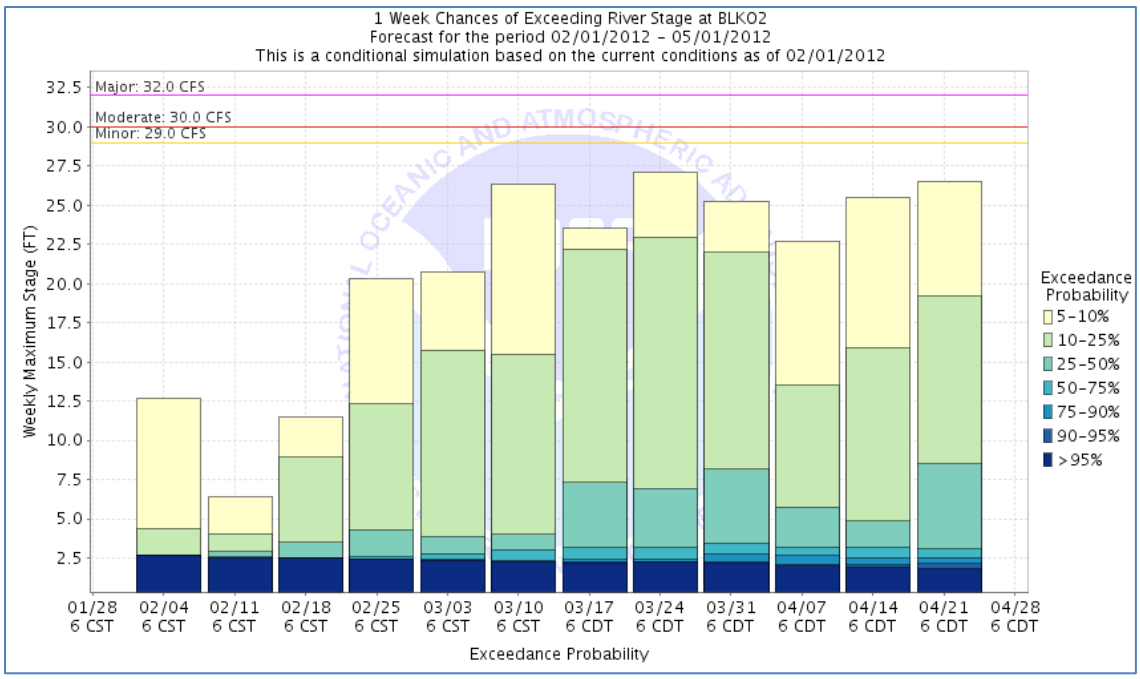
1 Overview

Delivered with any release of Graphics Generator in CHPS are templates designed to produce the AHPS products displayed on the AHPS webpage; for example:

http://water.weather.gov/ahps2/probability_information.php?wfo=eax&gage=snzm7

As of release OHD-CORE-CHPS 4.1.a, the AHPS products have been modified in order to make them standard across all RFCs. The four types of products delivered with Graphics Generator are as follows (with each type, an example output product file is shown along with the default file name for the output product file generated by Graphics Generator):

Probability Histogram
(5-quantile and 7-quantile versions are delivered with instructions provided for how to select which one to officially generate. This example is for a 7-quantile version.)



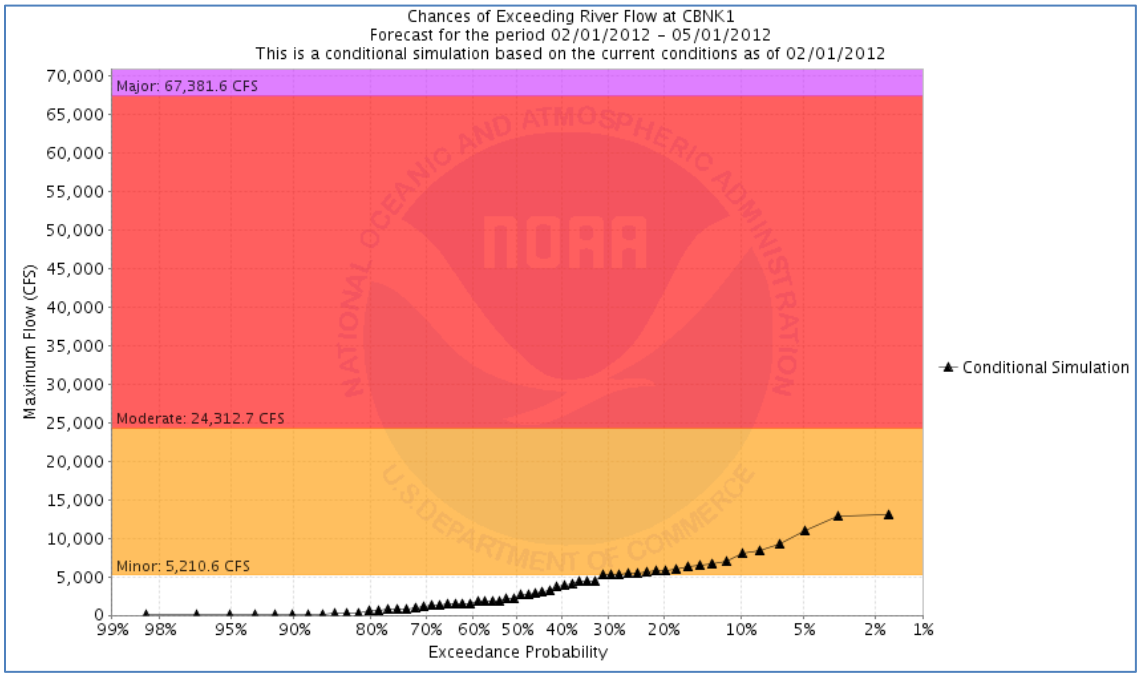
Graphics Generator Product Template IDs:

- Flow: AHPSFlowHistogram_#Values (#:5 or 7)
- Stage: AHPSStageHistogram_#Values
- Volume: AHPSVolumeHistogram_#Values

Output File Names:

- Flow: <segment id>.QINE.prob.weekint.png
- Stage: <segment id>.SSTG.prob.weekint.png
- Volume: <segment id>.volume.prob.weekint.png

Probability Plot



Graphics Generator Product Template IDs:

- Flow: AHPSFlowProbPlot
- Stage: AHPSStageProbPlot
- Volume: AHPSVolumeProbPlot

Output File Names:

- Flow: <segment id>.QINE.exceed.90day.png
- Stage: <segment id>.SSTG.exceed.90day
- Volume: <segment id>.volume.exceed.90day

Spaghetti Plot

(Graphics Generator outputs a tabular ASCII text file displaying the ensemble aggregated as is done for the preceding products.)

```
================================
DATA SOURCE #1
================================
Input Time Series:
  Location #1:
    Location id: CBNK1
    Location name: CBNK1
    Location description: null
    Parameter id: SSTG
    Ensemble id: ESP

Aggregations Performed In Order:
  Aggregator #1:
    Type: Maximum
    Period start time: 2012-02-01 12 GMT
    Period end time: 2012-05-01 12 GMT
    Time step: 1 weeks

Calculations Performed:
  Name: Spaghetti
Computed (Range) Data Description: Stage [FT]
Domain Data Description: Time

DATA:
                  Series: 1951                                      Series: 1952                                      Series: 1
          Time                   Stage [FT]              Time                   Stage [FT]              Time
+-----------------------++-----------------------++-----------------------++-----------------------++-----------------------++--
   2012-02-08 12 GMT            2.19          2012-02-08 12 GMT           2.179          2012-02-08 12 GMT
   2012-02-15 12 GMT           2.133          2012-02-15 12 GMT            2.13          2012-02-15 12 GMT
   2012-02-22 12 GMT           2.129          2012-02-22 12 GMT           2.116          2012-02-22 12 GMT
   2012-02-29 12 GMT           6.616          2012-02-29 12 GMT           2.098          2012-02-29 12 GMT
   2012-03-07 12 GMT           2.746          2012-03-07 12 GMT           2.599          2012-03-07 12 GMT
   2012-03-14 12 GMT           2.533          2012-03-14 12 GMT           5.828          2012-03-14 12 GMT
   2012-03-21 12 GMT           2.412          2012-03-21 12 GMT           2.815          2012-03-21 12 GMT
   2012-03-28 12 GMT            4.67          2012-03-28 12 GMT           2.484          2012-03-28 12 GMT
   2012-04-04 12 GMT           4.526          2012-04-04 12 GMT           2.364          2012-04-04 12 GMT
   2012-04-11 12 GMT           4.607          2012-04-11 12 GMT           2.271          2012-04-11 12 GMT
   2012-04-18 12 GMT           2.561          2012-04-18 12 GMT           2.214          2012-04-18 12 GMT
   2012-04-25 12 GMT           2.418          2012-04-25 12 GMT            6.49          2012-04-25 12 GMT
+-----------------------++-----------------------++-----------------------++-----------------------++-----------------------++--
```

Graphics Generator Product Template IDs:

- Flow: AHPSFlowSpaghetti
- Stage: AHPSStageSpaghetti

Output File Name:

- Flow: CBNK1.QINE.timeseries.weekint.txt
- Stage: CBNK1.SSTG.timeseries.weekint.txt

ESPADP Quantiles File

(Provided as an example, Graphics Generator outputs an ASCII text file of the same format as a "quantiles" tabular product generated by ESPADP.)

```
# ENSEMBLE HEADER INFORMATION
# Segment: CBNK1
# Trace File Name: NOT APPLICABLE
# Output Variable: Maximum
# Data Type: RIVER DISCHARGE
# Units: CFS
# Analysis Period: 02/01/2012 12 - 05/01/2012 12 GMT
# Interval: 02/01/2012 12 - 05/01/2012 12 GMT
#
# Statistics based on all years.
#
# EXCEEDANCE PROBABILITY ESTIMATES
#
# Distribution: Empirical
#       CS: Mean: 3424.63, StdDev: 3184.61
# Exceedance    Conditional
# Probabilities  Simulation
# -------------------------------------------
  0.900          117.547
  0.750          808.854
  0.500          2396.504
  0.250          5435.645
  0.100          7870.037

# EMPIRICAL SAMPLE POINTS
#           Cond.
#Trace    Year      Data Exceed.
# year  Weight      Point  Prob.
# --------------------------------
  1951  0.017   2913.866  0.459
  1952  0.017   2129.360  0.525
  1953  0.017   1510.144  0.639
  1954  0.017    127.961  0.885
  1955  0.017    768.769  0.770
  1956  0.017     34.509  0.934
  1957  0.017   5231.066  0.311
  1958  0.017   2683.249  0.475
  1959  0.017   1870.197  0.541
  1960  0.017   1790.835  0.574
  1961  0.017   1515.580  0.623
  1962  0.017     32.884  0.967
```

Graphics Generator Product Template IDs:

- Flow: AHPSFlowESPADPQuantiles

Output File Names:

- Flow: <segment id>.QINE.exceed.90day.png

The image products are for display on the AHPS webpage, replacing corresponding products produced by ESPADP, and, therefore, use the same file naming convention. The ASCII text products are to be used however the RFC requires.

Installing Graphics Generator AHPS products requires adding and updating FEWS configuration files, and using the FEWS GUI to finalize changes and verify the installation is successful. This guide provides a description of the products, instructions for installing the products for display in the CHPS interface, and instructions for setting up automated workflows for outputting the AHPS products for dissemination to end users.

In cases where a configuration file is new and generic (valid for all RFCs), the file is included in the release-package and added to the configuration. For cases where a configuration change contains text that is specific to an RFC (new or existing file) a description of the text and/or a sample file is provided.

Referenced Templates

The AHPS flow and stage products now make use of referenced templates in their design. The referenced template IDs are `AHPS5ValueHistogram`, `AHPS7ValueHistogram`, `AHPSCSProbabilityPlot` and `AHPSHSProbabilityPlot`. This was done in order to make it easier to update the computations and color schemes used for the histogram and probability plots, since, by using a template, colors need only be updated in a single referenced template instead of multiple product templates.

1.1 *Pre-installation Steps*

Perform the installation instructions provided in the *Graphics Generator Installation Guide*. Perform the following steps in the same test stand-alone as the one in which Graphics Generator was installed.

1.2 *Notation*

Within this document, the following notation is used:

- All graphical interface components are **Capitalized and in Bold**.
- All XML file snippets are in this font.
- All command line entries, XML elements, and properties are in this font.
- All important terms are *italicized* when first mentioned.

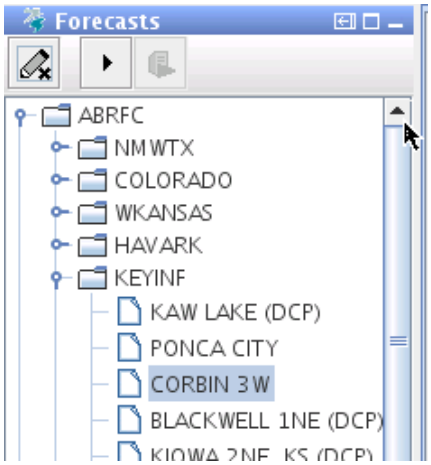
1.3 *Directories of Note*

The following directories will be referred to in the instructions provided below:

- <*region_dir*>: The stand-alone region home directory, typically "??rfc_sa".
- <*configuration_dir*>: The stand-alone Config directory, typically <region_dir>/Config.
- <*release_dir*>: The root directory of the untarred release package.

1.4 *Terminology*

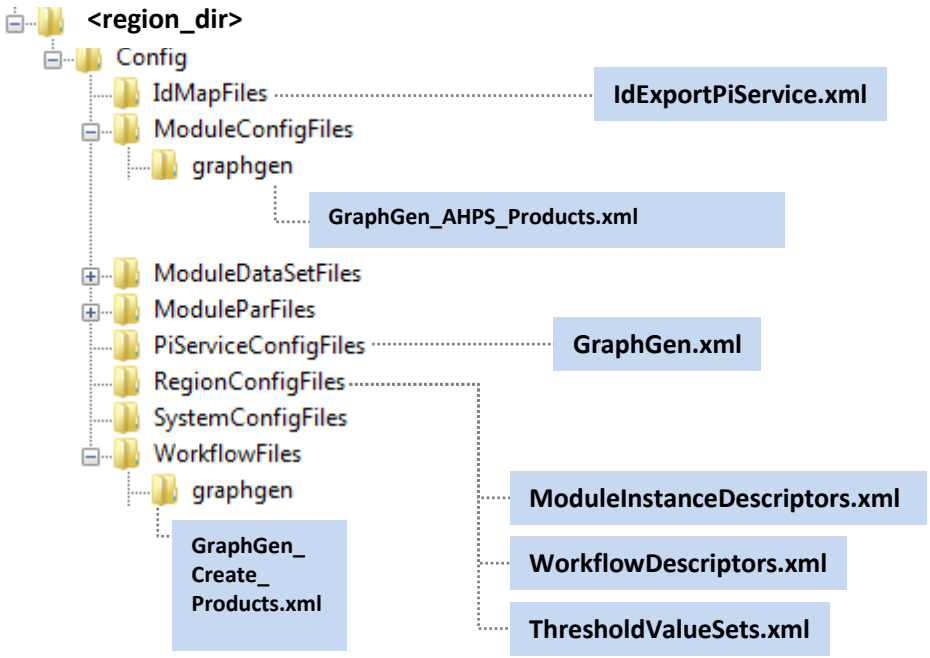
- *active forecast segment*: The current active segment, as selected in the **Forecasts Panel** of the CHPS interface and identified by the segment id set in the configuration file <*configuration file*>/RegionConfigFiles/Topology.xml. For example, for ABRFC, the active forecast segment in this case is CBNK1 (Corbin 3W):



- *identity mapping*: An id-mapping that maps one locationId onto itself; for example "<location external="WALN6DEL" internal="WALN6DEL"/>". Such mappings may be necessary for Graphics Generator to acquire needed time series; see Section 2.1.2.
- *installation stand-alone*: The stand-alone in which Graphics Generator will be installed.
- *subtitle*: Extra text displayed in a Graphics Generator product either below the x-axis, between the plot title and the chart, or to either side of the chart.
- *thresholdId*: Short-hand for the levelThresholdId defined for a threshold value in <*configuration_dir*>/RegionConfigFiles/ThresholdValueSets.

1.5 *Affected Configuration Files*

The diagram below summarizes all configuration files affected by the installation steps provided in this document.



2 Installing AHPS Products

This section provides general instructions for installing AHPS product templates provided in this release.

EARLIER VERSIONS OF PRODUCTS ALREADY INSTALLED

Throughout this and later sections, specific instructions intended for those who already have installed AHPS products will be provided in boxes like this one. Be sure that the installation stand-alone can display those earlier versions of the AHPS products.

The steps to perform are as follows (see the noted section for more information):

1. **Section 2.1.1**: Ensure that the QINE and SSTG queries defined in the GraphGen.xml PI-service configuration file return appropriate time series with the desired thresholds.

2. **Section 2.1.2**: Skip.

3. **Section 2.1.3**: Update the ThresholdValueSets.xml configuration file only if necessary to associate time series returned by the QINE and SSTG queries, described in Section 2.1.1, with the thresholds to display on the AHPS products.

4. **Section 2.2**: Modify the template forecast horizons, as done for earlier version of AHPS products.

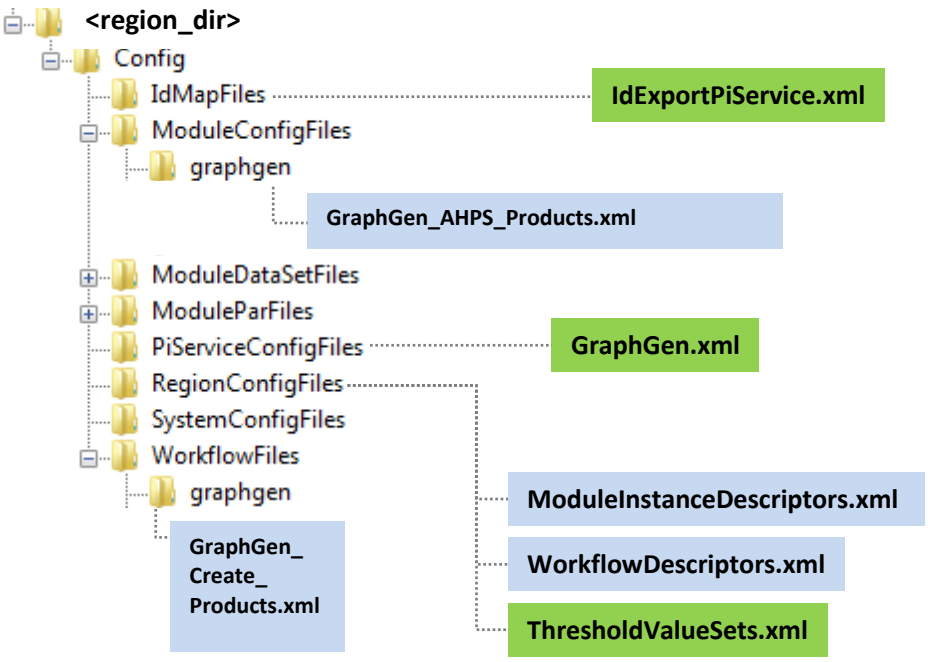
5. **Section 2.3**. Perform all steps described in this section to complete the configuration process. Some steps will include boxes such as this one providing instructions for if earlier versions of the AHPS products are already configured. Note, in particular, the following:

    - Step 9 can be skipped because segment-specific overrides of arguments should have already been defined for the earlier versions of the AHPS products.
    - Any RFC-specific changes to the AHPS products will need to be recreated using the new product. See Step 11.
    - Any versions of the AHPS products defined for alternate data types, such as reservoir pool elevation, must be recreated using the new products as a basis. See Step 15.
    - All earlier versions of the AHPS products that still remaining must be removed. Specifically, the histogram products have changed names in this release, so products using the earlier names, AHPS*Histogram, must be removed. See Step 15.

6. **Section 3.1.1**: Modify the pattern used to match AHPS product template ids as described in box within that section.

2.1 *Configuration File Changes (All Steps Required)*

Described below are changes that must be made to the configuration files in order for the Graphics Generator AHPS products to be generated. In the diagram below, the affected files are colored green:



2.1.1 Modify Existing File: GraphGen.xml

EARLIER VERSIONS OF PRODUCTS ALREADY INSTALLED
For the most part, this file will not require further changes. The exceptions are the QINE and SSTG queries (see below) which are included in the AHPS product templates in order to display thresholds. Read below to determine if a change is needed to those queries.

Action: Modify the file

<*configuration_dir*>/PiServiceConfigFiles/GraphGen.xml

so that the ensembles used to generate the AHPS products can be acquired via the FEWS PI-service. Details are below.

Description: The AHPS products are constructed using time series and ensembles returned by the following queries defined in GraphGen.xml (the first four are required, second two optional):

Query Id	Description
QINE ESP	This query must return the ensemble flow forecast used as a basis for streamflow AHPS products. The AHPS product templates assume that the time series have ensembleId "ESP".
SSTG ESP	This query must return the ensemble stage forecast used as a basis for river stage AHPS products. The AHPS product templates assume that the time series must have ensembleId "ESP".
QINE	This query must return a streamflow time series to which streamflow thresholds have been associated in order for thresholds to be displayed in the AHPS products (see Section 2.1.3).
SSTG	This query must return a stage time series to which streamflow thresholds have been associated in order for thresholds to be displayed in the AHPS products (see Section 2.1.3).
QINE HS (optional)	This query must return the ensemble flow historical simulation ensemble displayed in AHPS probability plots. The AHPS product templates assume that the time series have ensembleId "HS".
SSTG HS (optional)	This query must return the ensemble river stage historical simulation ensemble displayed in AHPS probability plots. The AHPS product templates assume that the time series have ensembleId "HS"

Each query is specified by one or more timeSeriesSet elements defining time series the query should return. The syntax is as follows:

```
<timeSeries>
   <id>QIN</id>
   <timeSeriesSet>
      …
```

```
    </timeSeriesSet>
</timeSeries>
```

where the element <id> is the query id. The contents of the timeSeriesSet element are RFC specific, and multiple timeSeriesSet elements can be included in a single time series query.

- The only requirement for the time steps of the time series returned by queries is that they do not exceed one day. A one-hour time step is valid, but may cause time series to take a long time to load.

- Forecast time series returned by a FEWS PI-service query are always the time series output by the most recently executed and approved workflow.

- For instructions on how to use Graphics Generator to check the queries defined in GraphGen.xml, see Section 2.5 of the *Graphics Generator Tips and Troubleshooting Guide*.

2.1.2 Modify Existing File: IdExportPiService.xml

EARLIER VERSIONS OF PRODUCTS ALREADY INSTALLED
This step can be skipped; no further changes should be necessary.

Action: Modify the file

<*configuration_dir*>/IdMapFiles/IdExportPiService.xml

to define id-mappings necessary for the display of the AHPS products. Details are below.

Description: The file is a standard id-mapping applied to the output from the PI-service queries defined in GraphGen.xml. **All Graphics Generator AHPS product templates are designed to expect all time series to have the same locationId and for that to match the segment id.** Therefore, id-mapping changes may be necessary if the following condition is met for at least one of the segments for which products are to be constructed:

- *The time series returned by the PI-service queries can contain time series with more than one locationId. For example, this is true if the "QINE ESP" and "SSTG ESP" return time series with different locationIds.*

In such a case, id-mappings should be defined to map all of the returned locationIds to the appropriate segment id. The following example displays id-mappings defined for MARFC for segments WALN6DEL and CNNN6DEL in order to produce AHPS and other products

Standard Location: <*configuration_dir*>**/IdMapFiles/**	**Contents:** ***IdExportPiService.xml***
<region_dir> Config IdMapFiles **IdExportPi Service.xml**	<?xml version="1.0" encoding="UTF-8"?> <idMap ...> <!-- Map all WALN6 output to the segment id, WALN6DEL --> <location external="WALN6DEL" internal="WALN6TOT"/> <location external="WALN6DEL" internal="WALN6DEL"/> <!--identify map--> <location external="WALN6DEL" internal="WALN6"/> <!-- Map all CNNN6 output to the segment id, CNNN6DEL --> <location external="CNNN6DEL" internal="CNNN6TOT"/> <location external="CNNN6DEL" internal="CNNN6TIF"/> <location external="CNNN6DEL" internal="CNNN6DEL"/> <!--identity map--> <location external="CNNN6DEL" internal="CNNN6"/> <enableOneToOneMapping/> </idMap>

In both cases, multiple locationIds are mapped to the segment id.

- Any mapping must include an *identity mapping*, which maps the segment id onto itself. For example <location external="WALN6DEL" internal="WALN6DEL"/>.

- If the time series returned by the PI-service always have the same locationId, but that locationId does not match the segment id defined in Topology.xml, an id-mapping can be used (do not leave out the identity mapping!). However, it may be preferable to use tools available via the **GraphGen Tree Panel**; see Section 6.1.1.

2.1.3 Modify Existing File: ThresholdValueSets.xml

EARLIER VERSIONS OF PRODUCTS ALREADY INSTALLED
If you setup the thresholds to be visible for the earlier release of the AHPS products, no further changes should be necessary; skip this step. Otherwise, note that the time series returned by the QINE and SSTG queries described in Section 2.1.1 are used to access the thresholds. Make changes as described below relative to the time series returned by those two PI-service queries if necessary.

Action: Modify the file

<*configuration_dir*>/RegionConfigFiles/ThresholdValueSets.xml

as needed to define thresholds that can be displayed in the AHPS products.

Description: The ThresholdValueSets.xml file defines thresholds that can be displayed in Graphics Generator products. The thresholds are defined by time series: the file specifies timeSeriesSet elements and thresholds that apply to those time series. Within the file, thresholds are identified by a levelThresholdId element, referred to herein as the *threshold id*; for example:

```
<levelThresholdValue>
   <levelThresholdId>MAJOR</levelThresholdId>
   <value>14.0</value>
</levelThresholdValue>
```

In this case, the threshold id is "MAJOR". Graphics Generator acquires the thresholds when it loads input time series, either by querying the PI-service or by reading an XML file.

For the standard AHPS products delivered with the GraphGen software, three thresholds can be displayed: minor, moderate, and major flooding. Examine the ThresholdValueSets.xml file and check if those thresholds or equivalent thresholds are defined. If so, **record the appropriate threshold ids**. For example, for ABRFC, the ids are "FS", "MOD", and "MAJOR" respectively, whereas for NERFC, they are "MINOR", "MOD", and "MAJOR". The recorded threshold ids will be referred to in a later step.

If only one appropriate threshold is available, the product should be displayed correctly (that threshold is assumed to be unbounded above and the other thresholds are ignored with warning messages).

If two appropriate thresholds are available, the products should be displayed correctly unless it is a probability plot (product template id of AHPS*ProbabilityPlot) and the moderate threshold is missing. For probability plots, thresholds are displayed as partially transparent zones (i.e., filled in areas). If the moderate threshold is not available, the shading for the minor threshold zone will be displayed under the major threshold zone, mixing with that color and resulting in a major zone that is not shaded correctly. In that case, a new product template will need to be created

that excludes the MODERATE threshold. See Section 6.2.1, but only remove the MODERATE threshold.

If no appropriate thresholds are defined, the following options are available:

- Remove all of the thresholds to display for one or more segments: See Section 6.2.1.
- Add required thresholds and time series to the ThresholdValueSets.xml file.

For troubleshooting tips related to thresholds, see Section 6.2.

2.2 *Modify AHPS Product Templates for Forecast Horizon (as Needed)*

EARLIER VERSIONS OF PRODUCTS ALREADY INSTALLED
Perform the same modifications as done when installing the earlier version.

Action: Identify the length of your AHPS forecast runs. If your AHPS forecasts are not for 90 days, then the product templates must be edited prior to import as follows:

1. Open the file:

   <*release_dir*>/graphgen/installFiles/graphgen/ahpsInstallationImport.xml

   in any editor.

2. Replace all instances of "T0 + 90 days" with the correct forecast length. For example, if your forecasts are for 30 days, replace the string with "T0 + 30 days".

3. Replace instances of "T0 + 84 days" with the correct length; this should be the largest number of days smaller than the total forecast length but divisible by 7 days. For example, if your forecasts are for 30 days, replace the string with "T0 + 28 days" (4 weeks after T0). These values are used to define the domain axis limits for the AHPS histogram products.

4. Save the file and exit.

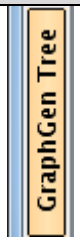
This change can be made via the **GraphGen Editor Panel**, if desired. The instructions above are provided in order to save time. Changes must be made in the **Aggregators Panel** of the **Chart Series Definition Panel** and in the **Appearance Panel** (plot title and domain axis limits) for each of the eight AHPS products. See the *Graphics Generator Reference Manual* for more information.

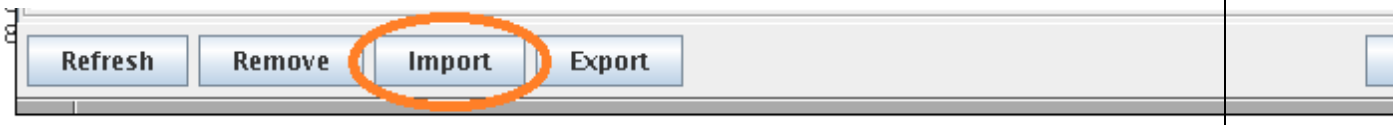
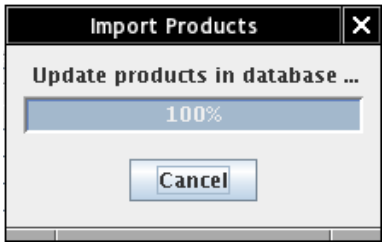
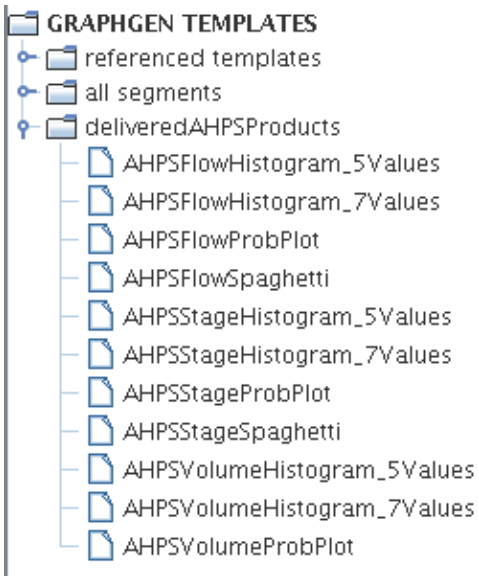
2.3 *Complete AHPS Product Template Installation (Required)*

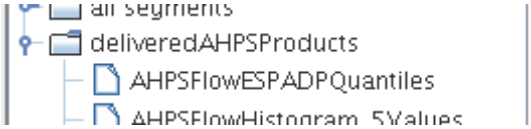
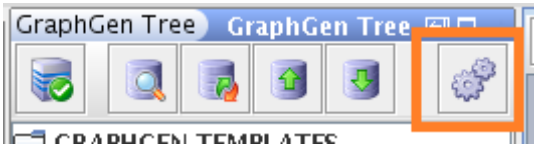
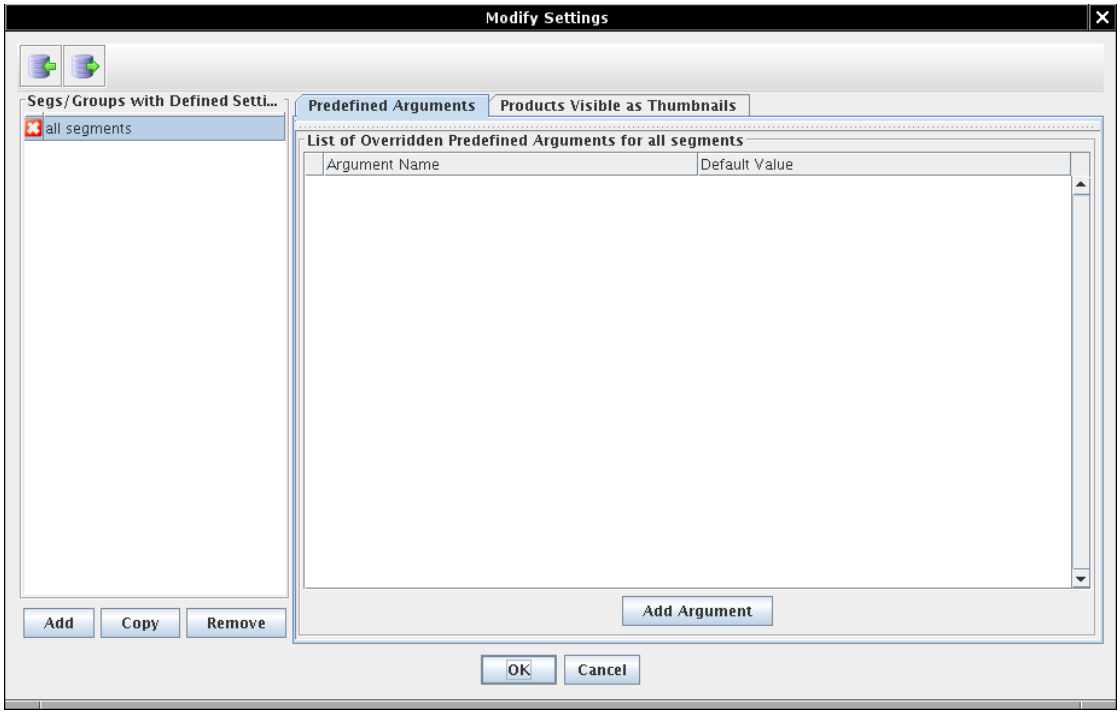
Description: Use the Graphics Generator FEWS explorer plug-ins to complete the installation process. Before following the steps provided below, do the following:

1. Start FEWS.
2. Set the FEWS PI-service port number; see Section 2.3 of the *Graphics Generator Tips and Troubleshooting Guide*.

Do the following to complete the installation (based on Section 2.7.2 of the *Graphics Generator Tips and Troubleshooting Guide* on importing ported Graphics Generator product templates):

#	Action
1	Click on the  (tab) on the left to open the **GraphGen Tree Panel**.
2	Click on the **Manage Products Button**,  , in the toolbar of the **GraphGen Tree Panel** to open the **Product and Template Manager Dialog**; for example:

#	Action
3	Click on the **Import Button** at the bottom of the dialog: 
4	In the **Select Import File Dialog** that opens, select the file <*release_dir*>/graphgen/installFiles/graphgen/ahpsInstallationImport.xml and click **Import**. A status dialog will open displaying progress of the import:  Once the import is complete, the dialog will close and the AHPS product templates will be added to the **GraphGen Tree Panel**. Click on the **Close Button** in the **Product and Template Manager Dialog**. In the **GraphGen Tree Panel**, expand the branch "deliveredAHPSProducts" to see a listing of the product templates (the AHPS* templates were just imported):  **EARLIER VERSIONS OF PRODUCTS PREVIOUSLY INSTALLED** Note that the new versions are installed in the group "deliveredAHPSProducts", so that the old products are not immediately overwritten (see below).

#	Action
5	(OPTIONAL) If the ESPADP quantiles product template, AHPSFlowESPADPQuantiles, is to be included, then perform Steps 2 – 4 again, but import the file: <*release_dir*>/graphgen/installFiles/graphgen/ahpsFlowESPADPQuantilesInstallationImport.xml Upon completion, the product template will be included in the group "deliveredAHPSProducts" within the **GraphGen Tree Panel**:   The AHPSFlowESPADPQuantiles product template was created in response to a need reported by RFCs to produce an output product equivalent (as closely as possible) to the legacy ESPADP quantiles ASCII text file product.
6	Click on the **Change Default Settings Button**,  , in the toolbar of the **GraphGen Tree Panel**:  The **Modify Settings Dialog** will open: 

#	Action
7	

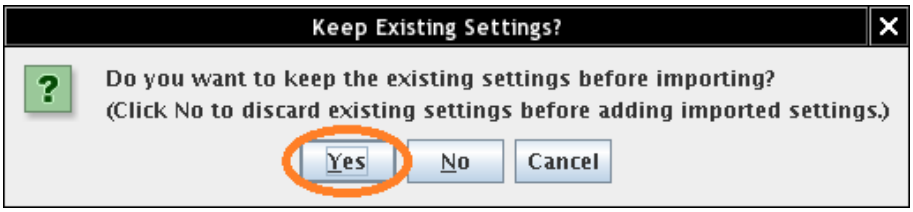
EARLIER VERSIONS OF PRODUCTS ALREADY INSTALLED

Before proceeding, note the values already set for the arguments ahpsDisplayTimeZone, ahpsMinorFloodingThresholdId, ahpsModerateFloodingThresholdId, and ahpsMajorFloodingThresholdId. These values will be recovered later.

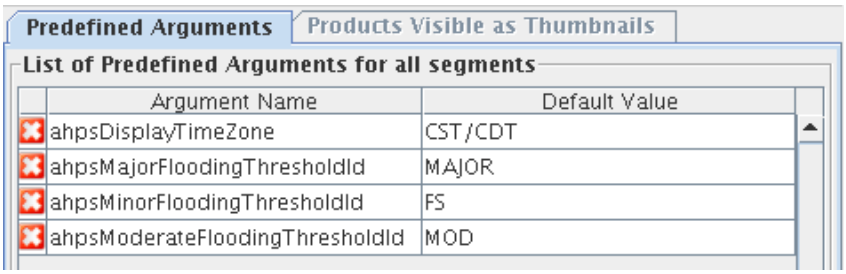
Click on the **Import Settings Button**,  , in the tool bar of the dialog. When the **Select Import File Dialog** opens, select the file

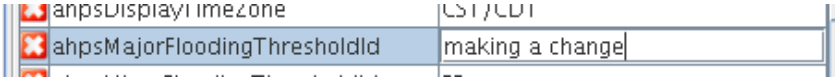
<*release_dir*>/graphgen/installFiles/graphgen/ahpsSettingsImport.xml

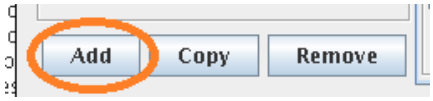
and click **Open**. When the **Keep Existing Settings? Dialog** opens, click **Yes**:



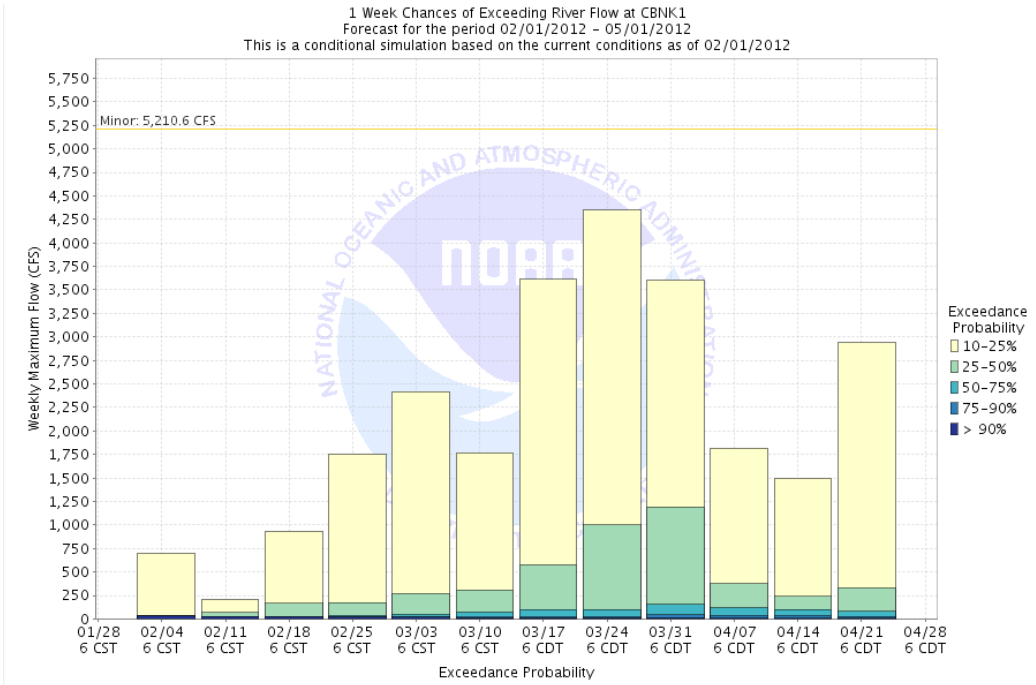
The **Predefined Arguments Tabbed Panel** will display default predefined arguments settings for "all segments" (the list item selected initially in the **Segments with Defined Settings List** on the left side of the dialog):

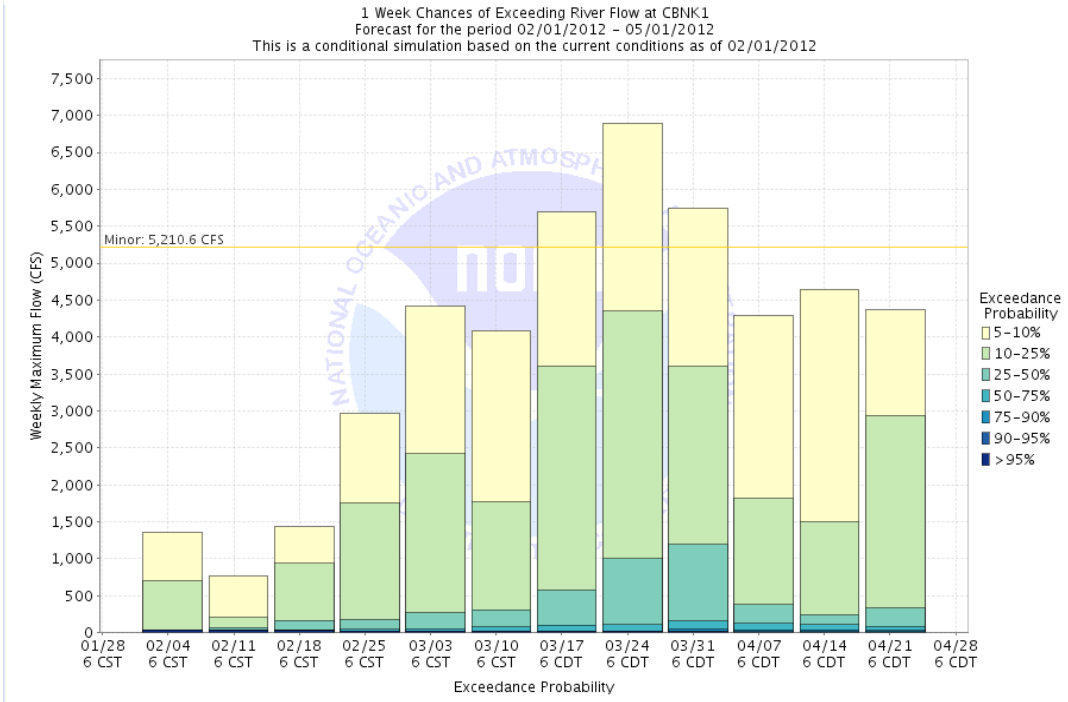


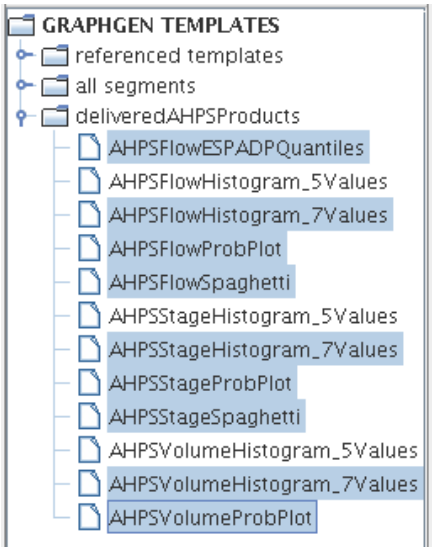
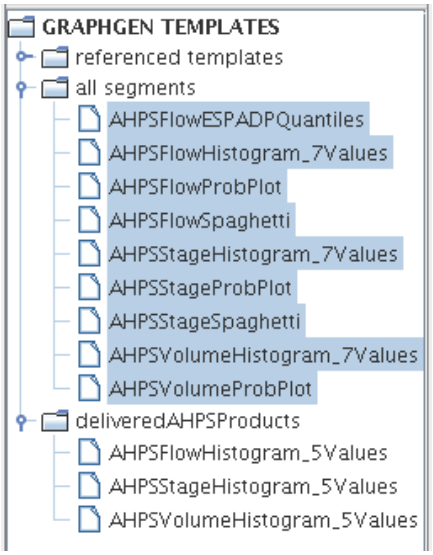
#	Action
8	**EARLIER VERSIONS OF PRODUCTS ALREADY INSTALLED** Recover the argument values recorded in the previous step in this step. Modify the predefined arguments as needed. To change a setting, click on the cell in the Default Value column and type the new value:  Modifications should be as follows: *Argument:* ahpsDisplayTimeZone Set it to the appropriate default time zone for your RFC: "CST/CDT". *Argument:* ahpsMajorFloodingThreshold*;* ahpsMinorFloodingThreshold*;* ahpsModerateFloodingThreshold Set the values to those provided in Step 2.1.3. Note the following: • If the thresholdIds differ between segments, then choose one to serve as the 'default' thresholdId recorded for "all segments". Later, it will be shown how to override this setting for specific segments. • If no appropriate thresholds exist, make the 'Default Value' column blank (empty) for the three thresholds. • If only a single flood level is defined (presumably a minor flooding level), set the ahpsMinorFloodingThresholdId appropriately and set the other two to be blank. • If thresholds are defined for some segments but not others, set the 'default' thresholdIds for "all segments" and note that for other segments the thresholds will not load properly, but the products will still be generated.

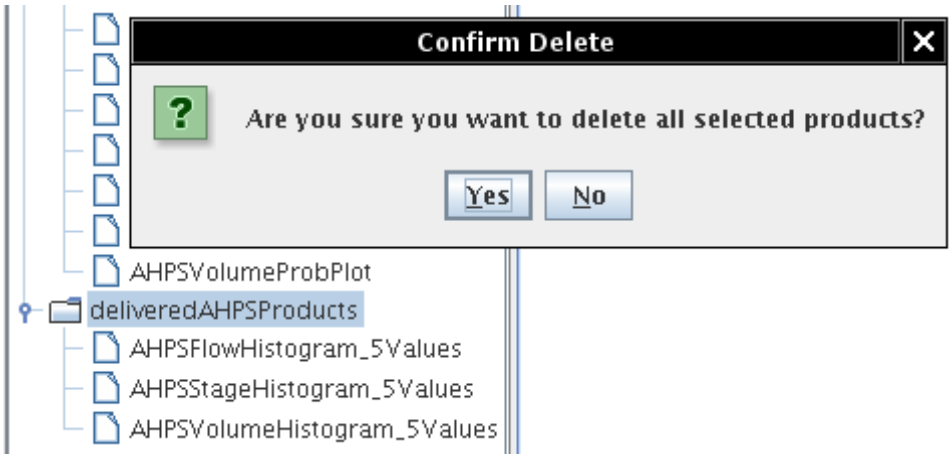
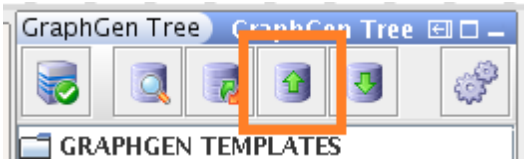
#	Action
9	**EARLIER VERSIONS OF PRODUCTS ALREADY INSTALLED** Skip this step. Segment-specific overridden argument values should have already been set for the earlier version of the AHPS products. Override the predefined arguments for segments that must use argument values that do not match the defaults set in the preceding step for "all segments". For example, if the time zone for a segment does not match the default defined for "all segments", it can be overridden. To Override a predefined argument, if the segment id (based on Topology.xml) of the segment for which to override settings is already in the **Segments with Defined Settings List**, select it. Otherwise click the **Add Button** under the list  and in the **Specify Segment Dialog** that opens enter the segment id and click **OK**. After the dialog closes, the segment will be selected in the **Segments with Defined Settings List**. With the appropriate segment selected, the **Predefined Arguments Tabbed Panel** on the left will display the overridden predefined arguments for that segment. If the argument to override is already in the **List of Predefined Arguments Table**, change its value if necessary (click on the Default Value cell, type in the new value, and press <Enter>). Otherwise, add the argument by clicking on the **Add Argument Button**  When the **Specify Argument Name Dialog** opens, set the argument name appropriately and click **OK**. Change the argument's value by clicking on the Default Value cell in the **List of Predefined Arguments Table**, typing in the appropriate value, and pressing <Enter>.
10	Click **OK** to close the **Modify Settings Dialog**: 
11	**EARLIER VERSIONS OF PRODUCTS ALREADY INSTALLED** If changes were made directly to the earlier versions of the AHPS product templates, then those changes should be repeated now to the new templates within the group "deliveredAHPSProducts". However, note that these product templates are supposed to be standard across all RFCs, so some such changes may no longer be appropriate. For example, if customized probability quantiles or color schemes were used, then do not change these products to account for them as they would make the products no longer standard. If special versions of the product tempaltes were created to display, for example, reservoir data, those special versions should be created again based on the new templates; see Step 15.

#	Action
12	Select whether 5-quantile (*_5Values) or 7-quantile (*_7Values) probability histograms will be used for your AHPS products. Only one of those two products will be visible for flow, stage, and volume on the AHPS website. Note your selection for use in the next step. Here are two examples (5-quantile and 7-quantile respectively):



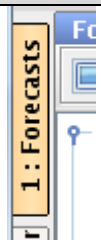
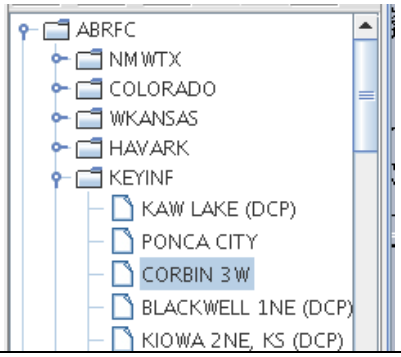


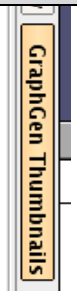
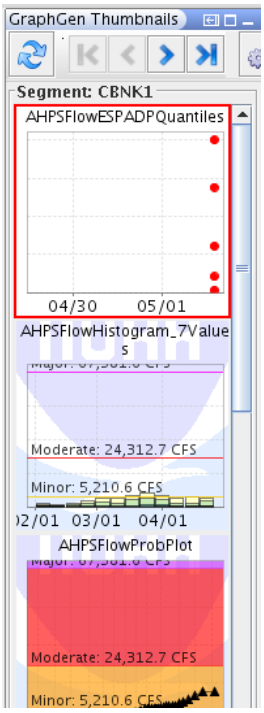
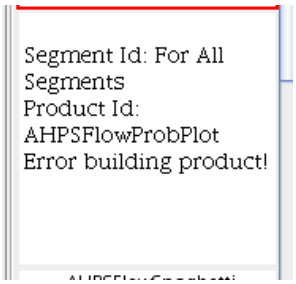
#	Action
13	Move the products that will be used from the "deliveredAHPSProducts" group to the "all segments" group. To do so, within the **GraphGen Tree Panel**, select the products to be used, based on the decision made in the preceding step (example assumes the 7-quantile versions will be used, so that the *_7Values product templates are selected):  When selecting the last product, leave the mouse button pressed, drag the products to the "all segments" node, and release the button. The tree will now display the following:   It may be easier to click-and-drag each used product template one at a time from the "deliveredAHPSProducts" group to the "all segments" group.

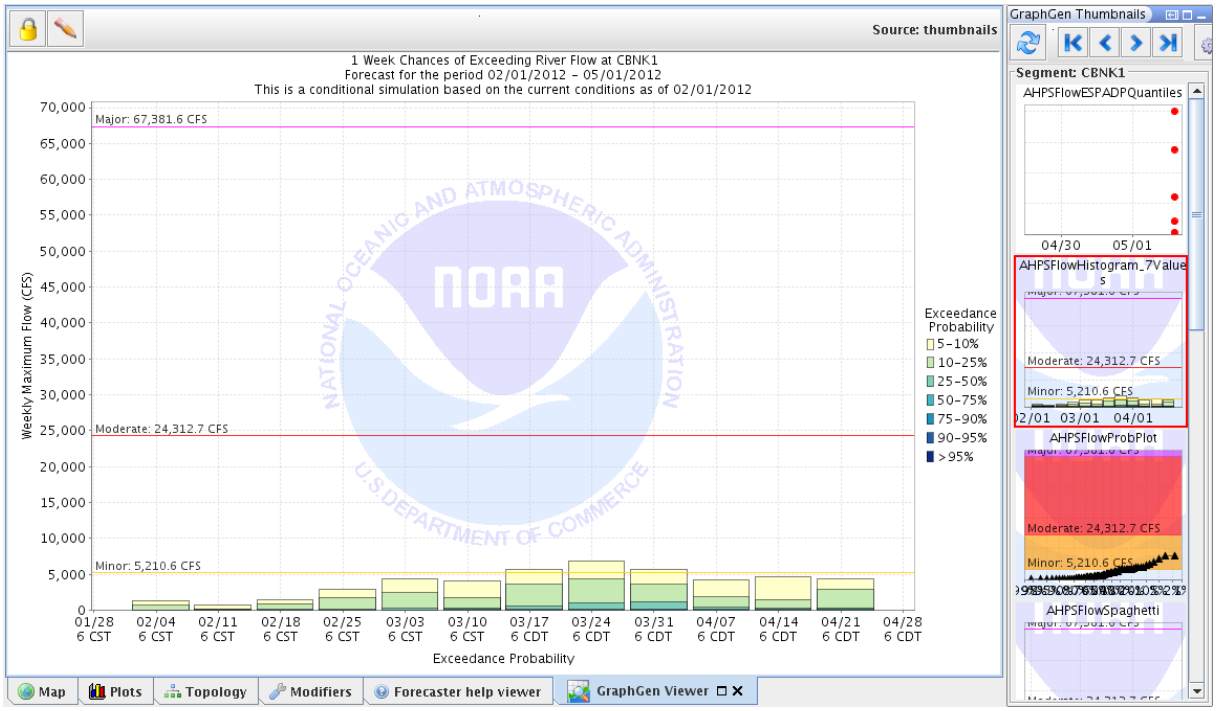
#	Action
14	Remove the "deliveredAHPSProducts" group. This group will be re-used for future releases, so it is best to remove the existing group to avoid possible confusion. To do so, select the group in the **GraphGen Tree Panel** and press the <Delete> key. Click **Yes** when the **Confirm Delete Dialog** opens.   If you prefer you can rename the group, instead, so that the unused product templates are not lost. To do so, select the group and, after selecting, click on the "deliveredAHPSProducts" label to edit the group name.
15	**EARLIER VERSIONS OF PRODUCTS ALREADY INSTALLED** 1. If alternate versions of the AHPS product templates were created to allow for displaying other data types, such as reservoir output, then those alternate versions should be recreated at this time using the products just moved into "all segments", above. The steps performed to create the earlier version of the alternate AHPS product templates should be performed in the exact same manner for the new product templates. 2. Once all of the alternate versions of the AHPS product templates have been created, remove any old versions of the AHPS product templates that still exist. For example, the old AHPS*Histogram product templates can be removed since the new versions now include the suffix "_#Values" at the end of their ids.
16	Upload all changes to the central area. In the **GraphGen Tree Panel**, click on the **Upload Products Button**:  When the confirmation dialog opens, click **Yes**.

2.4 *Verify AHPS Product Template Installation (Optional)*

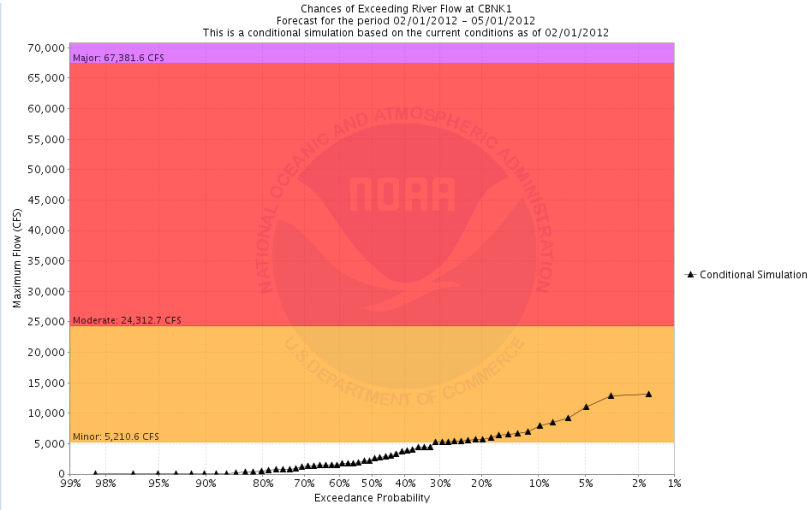
To verify that the AHPS product templates installed successfully, do the following:

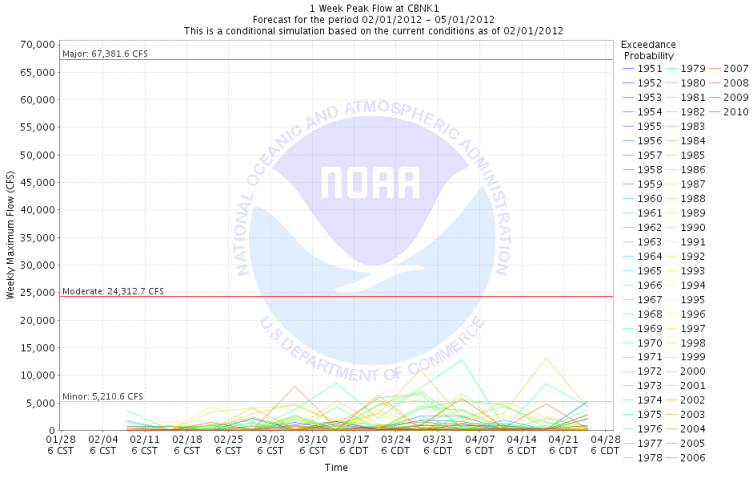
#	Action
1	Click on the  (tab) on the left to open the **Forecasts Panel**.
2	If not already in view mode, click on the **View Mode Button** to switch to view mode; the button will change after clicking as follows: 
3	Select a segment for which the required ensemble should be in the localDataStore. For example, for ABRFC: 

#	Action
4	 Click on the (tab) on the right to open the **GraphGen Thumbnails Panel**. Upon clicking, Graphics Generator will generate the graphics associated with the group "all segments", including the AHPS products. This may take some time, particularly if the time series use a 1-hour time step. Upon completion, the **GraphGen Thumbnails Panel** will display the AHPS product images for the selected segment, for example (ABRFC including the AHPSFlowESPADPQuantiles product template):  If an error occurs, then a product image might be displayed as follows:  See Section 6 for trouble shooting tips.

#	Action
5	In the **GraphGen Thumbnails Panel**, select a product image to view; for example "AHPSFlowHistogram_7Values". In the CHPS main toolbar, click on the **GraphGen Viewer Button**,  . The **GraphGen Viewer Panel** will open and, after a few moments building the product, will display the image in the **GraphGen Thumbnails Panel** (example for ABRFC): 
6	In the **GraphGen Viewer Panel**, click on the **Lock/Unlock Viewer Button**,  , to unlock the viewer so that it will update when selections are made from the **GraphGen Thumbnails Panel**. After the button is clicked, it will display that it is unlocked:  .

#	Action
7	Click on each of the AHPS product thumbnails in the **GraphGen Thumbnails Panel** one at a time. After each click, the **GraphGen Viewer Panel** will update to display the product. In addition to the previous example, two more examples below are for ABRFC:





Notice that in each example chart the flood threshold value is displayed in the label for each threshold. If an appropriate threshold was not defined in Section 2.1.3, that threshold will not be displayed in the chart and an info-level message indicating that there was a "[p]roblem processing threshold…" will be output to the CHPS **Logs Panel**.

2.5 *Modify Plot Titles to use the Descriptive River Name (Optional)*

The default plot title for all products includes the text "at <5-character id>" at the end of the first line. Optionally, the title can be changed so that, instead, it states, "on <river name> at <item from proximity table>". Typically, this information is included in the configuration file

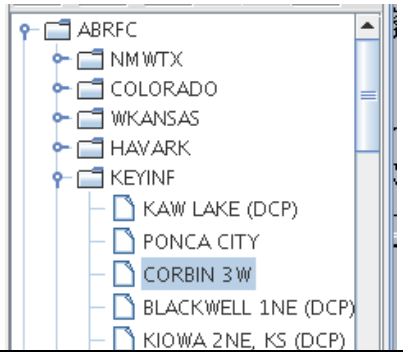
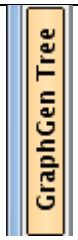
<*configuration dir*>/RegionConfigFiles/Locations.xml

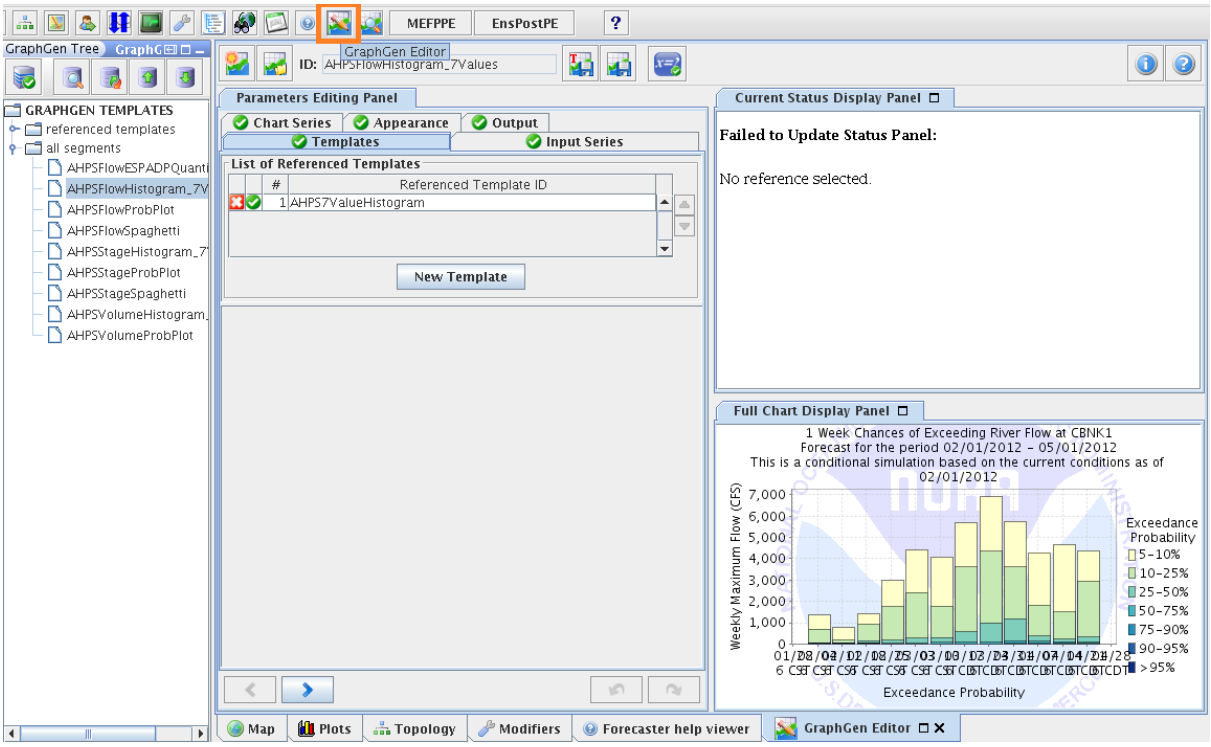
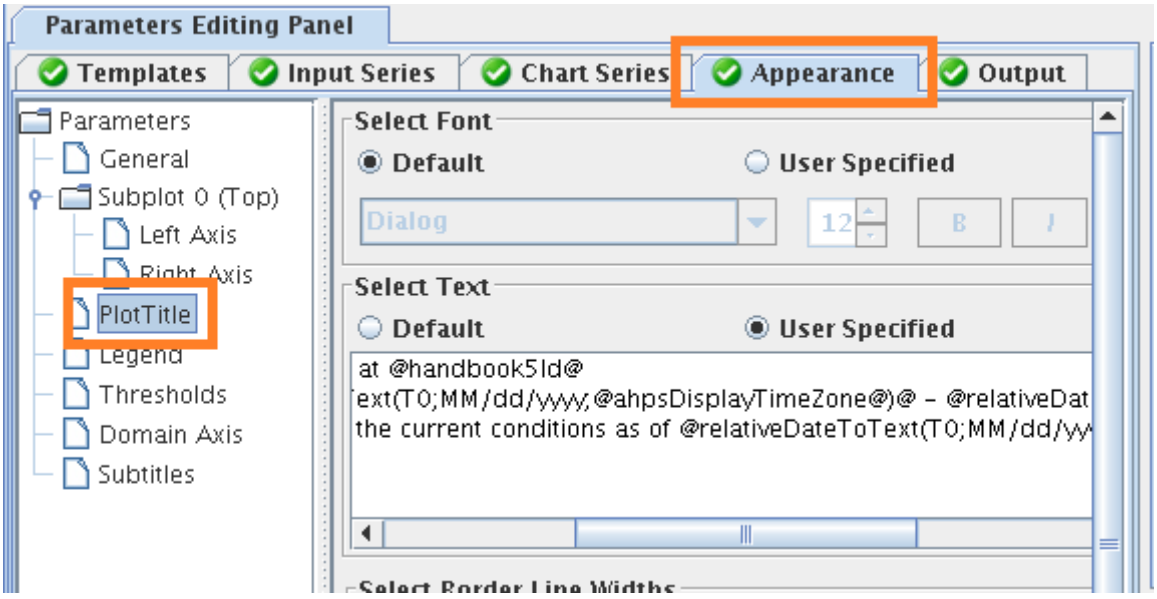
For example:

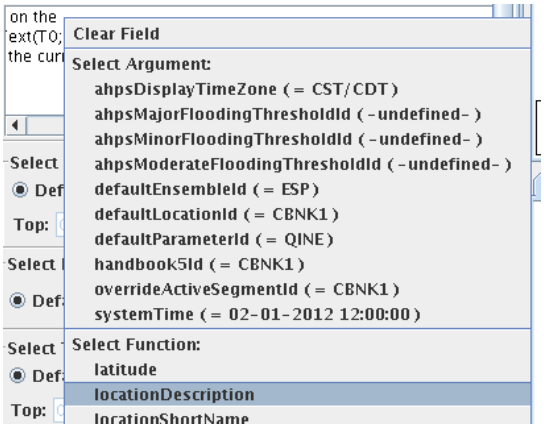
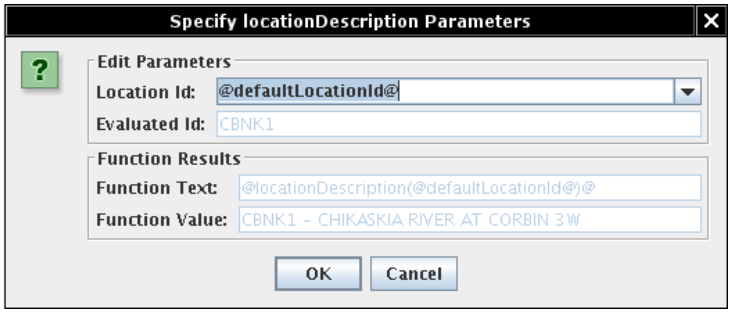
```
<location id="CBNK1" name="CBNK1">
<description>CBNK1 - CHIKASKIA RIVER AT CORBIN 3W</description>
    <shortName>CBNK1</shortName>
    <toolTip>%DESCRIPTION%\nLast Value:\[%LAST_VALUE%\]
Time\[%LAST_VALUE_TIME%\]\nAction Stage: 8. \nFlood Stage: 10 \nModerate Flood: 19
 \nMajor Flood: 28 \nFlood of Record: 22.75</toolTip>
    <x>-97.6016666667</x>
    <y>37.1291666667</y>
    <z>342.9</z>
</location>
```

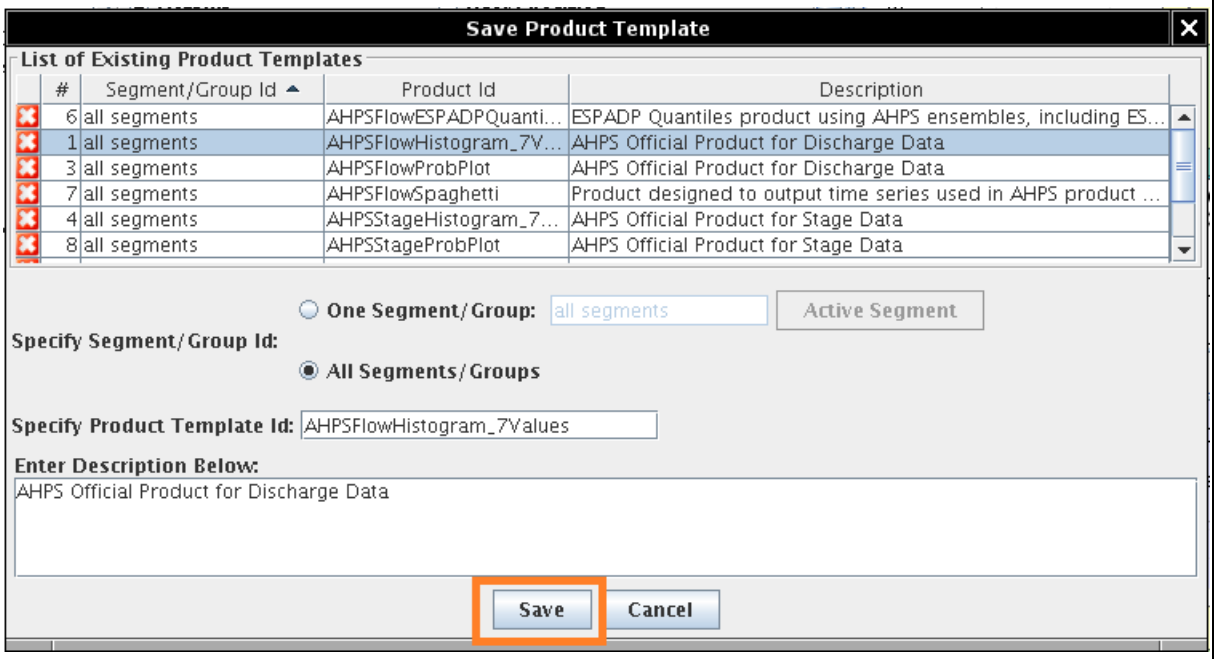
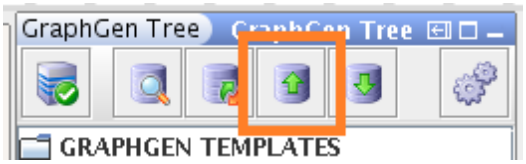
Graphics Generator has access to the description, shortName, and coordinates (x, y) XML elements contained in that file. If the plot title is to use the "on <river name> at <item from proximity table>" text, then either the description, shortName, or a combination of those XML elements must contain text to display. Identify which XML element contains the text to display; in the example above, the description XML element contains all the needed information. Perform the following steps to change the plot title for a product (repeat these steps for all product templates affected):

#	Action
1	Click on the  (tab) on the left to open the **Forecasts Panel**.

#	Action
2	If not already in view mode, click on the **View Mode Button** to switch to view mode; the button will change after clicking as follows: 
3	Select a segment for which the required ensemble should be in the localDataStore. For example, for ABRFC: 
4	Click on the  (tab) on the left to open the **GraphGen Tree Panel**.

#	Action
5	Select the product template to edit from the **GraphGen Tree Panel** and click on the **GraphGen Editor Button** to open up the **GraphGen Editor Panel**: 
6	Click on the **Appearance Tab** and select “Plot Title” from the **Tree** on the left: 

#	Action
7	In the **Select Text Area**, modify the first line of the text appropriately, making use of the locationDescription and/or locationShortName argument functions. For the ABRFC example above, this can be done by deleting "at @handbook5Id@" at the end of the first line and typing in the following: "on the @locationDescription(@defaultLocationId@)@" Note that the locationDescription argument function is used. Alternatively to typing the function in by hand, after typing in "on the ", right click on the text area and select the **locationDescription** item from the popup menu:  In the **Specify Parameters Dialog** that opens, change the **Location Id Field** to be "@defaultLocationId@" and click **OK**:  Upon clicking **OK**, the text "@locationDescription(@defaultLocationId@)@" will be inserted into the text area at the cursor location.

#	Action
8	Save the product template. Click on the **Save as Product Template Button** in the toolbar of the **GraphGen Editor Panel** and when the **Save Product Template Dialog** opens, click **Save.** 
9	Close the **GraphGen Edit Panel** by clicking on the 'X' in the **GraphGen Editor Tab** at the bottom of the panel: 
10	Upload all changes to the central area. In the **GraphGen Tree Panel**, click on the **Upload Products Button**:  When the confirmation dialog opens, click **Yes**.

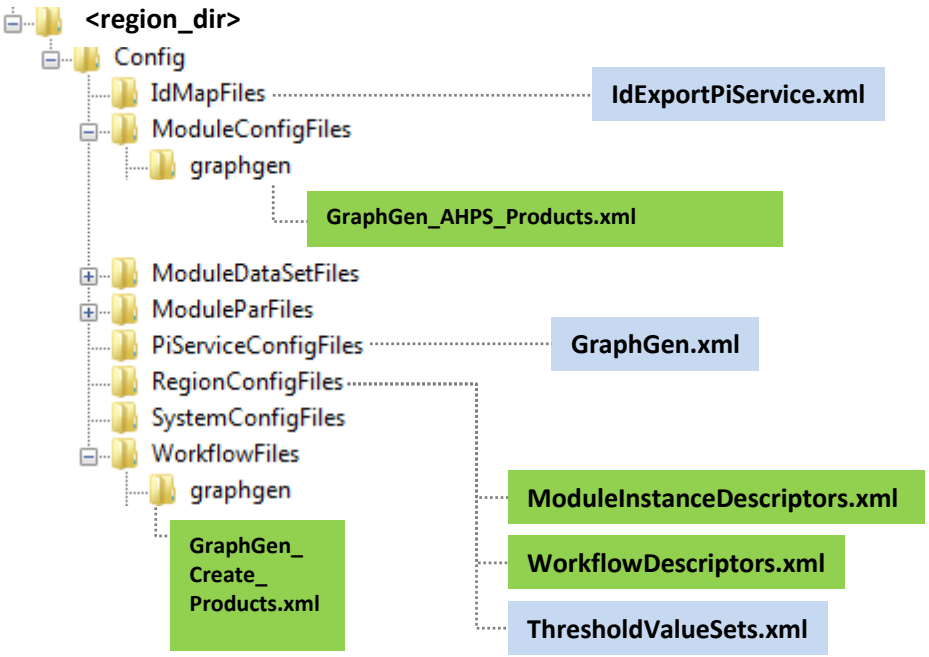
3 Setting Up Automated Graphics Generator Workflows

This section provides instructions for setting up scheduled tasks in CHPS to execute workflows that generate the AHPS products output files.

The steps in Section 3.1 of the *Graphics Generator Installation Guide* must be performed before completing these steps.

3.1 *Configuration File Changes (All Steps Required)*

Described below are changes that must be made to the configuration files in order for a workflow to be constructed that generates the Graphics Generator products, using AHPS products as an example. In the diagram below, the affected files are colored green:



3.1.1 Add New File: GraphGen_AHPS_Products.xml

Action: If it does not already exist, create the directory

<*configuration_dir*>/ModuleConfigFiles/graphgen

Open an editor to create the following file under that directory:

GraphGen_AHPS_Products.xml.

Copy the entire contents of the example below to the file and modify the segment specific lines, highlighted in yellow in the example file, accordingly so that segments for which to generate the products are specified. More details are below. Also, modify the RFC specific line providing the value of the run file property baseOutputDir, highlighted in green in the example file, to specify an appropriate base output directory for product files to be written, possibly using global properties; see Section 3.1.1 of the *Graphics Generator Installation Guide*.

Description: The module will be defined to generate products for all segments for which products are to be generated. The example provided below has been constructed for the AHPS products at ABRFC. It should work for any RFC, except the lines that are segment dependent (highlighted in yellow in the example file):

```
<string key="products.CBNK1" value="AHPS.*"/>
<string key="products.BLKO2" value="AHPS.*"/>
```

These lines need to be changed to reflect the correct segment ids. The syntax is as follows:

```
<string key="products.<segmentId>" value="<pattern>"/>
```

Where <segmentId> is the segment id of the segment for which to generate products and <pattern> is a pattern defining which products to generate. The <pattern> in the example above will match any product template for which the id starts with "AHPS". For more information on the syntax of <pattern> and the adapter in general, see the *Graphics Generator Reference Manual***.**

EARLIER VERSIONS OF PRODUCTS ALREADY INSTALLED

Earlier module configuration files created based on older versions of this guide may have used the following pattern to match product template ids:

AHPS[a-zA-Z]*

To allow for numbers to be part of AHPS product template ids (see below), change it to:

AHPS.*

See the lines highlighted in yellow in the example below.

The AHPS product templates are currently configured to generate the following output files (product id – file created under baseOutputDir):

- AHPSStageHistogram_#Values -- <segmentId>.SSTG.prob.weekint.png
- AHPSStageSpaghetti – <segmentId>.SSTG.timeseries.weekint.txt
- AHPSStageProbPloti – <segmentId>.SSTG.exceed.90day.png
- AHPSFlowHistogram_#Values -- <segmentId>.QINE.prob.weekint.png
- AHPSFlowSpaghetti – <segmentId>.QINE.timeseries.weekint.txt
- AHPSFlowProbPlot -- <segmentId>.QINE.exceed.90day.png
- AHPSVolumeHistogram_#Values -- <segmentId>.volume.prob.weekint.png
- AHPSVolumeProbPlot -- <segmentId>.volume.exceed.90day.png
- (optional) AHPSFlowESPADPQuantiles – <segmentId>.espadp.quantiles.txt

The **GraphGen Editor Panel** can be used to modify the name of the output files as needed by your RFC. See Section 13 (Editor: Output Panel) of the *Graphics Generator Reference Manual* for how to make that change.

The configuration depends upon the global properties ohdGraphgenCentralDir, piServiceBackendRFCIdentifier, piServiceHostName, and piServicePortNumber being defined; see Section 3.1.2 of the *Graphics Generator Installation Guide*.

Standard Location: <*configuration_dir*>**/ModuleConfigFiles/graphgen/**	**Contents:** ***GraphGen_AHPS_Products.xml***
<region_dir> Config IdMapFiles ModuleConfigFiles graphgen **GraphGen_ AHPS_ Products.xml**	<?xml version="1.0" encoding="UTF-8"?> <generalAdapterRun xmlns="http://www.wldelft.nl/fews" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.wldelft.nl/fews http://chps1/schemas/generalAdapterRun.xsd"> <general> <description>GraphGen Products</description> <rootDir>%TEMP_DIR%</rootDir> <workDir>%ROOT_DIR%/work</workDir> <exportDir>%ROOT_DIR%/input</exportDir> <exportDataSetDir>%ROOT_DIR%</exportDataSetDir> <importDir>%ROOT_DIR%/output</importDir> <dumpFileDir>$GA_DUMPFILEDIR$</dumpFileDir> <dumpDir>%ROOT_DIR%</dumpDir> <diagnosticFile>%ROOT_DIR%/output/diag.xml</diagnosticFile> </general> <activities> <startUpActivities> <makeDir> <dir>%ROOT_DIR%/output</dir> </makeDir> <makeDir> <dir>%ROOT_DIR%/work</dir> </makeDir>

Standard Location: <*configuration_dir*>**/ModuleConfigFiles/graphgen/**	**Contents:** ***GraphGen_AHPS_Products.xml***

```
        <makeDir>
          <dir=$EXPORT_DIR$/products</dir>
        </makeDir>
      </startUpActivities>
      <exportActivities>
        <exportRunFileActivity>
          <exportFile>%ROOT_DIR%/run_info.xml</exportFile>
          <properties>
            <int key="printDebugInfo" value="0"/>
           <string key="piServiceBackendRFCIdentifier"
value="$piServiceBackendRFCIdentifier$"/>
            <string key="piServiceHostName" value="$piServiceHostName$"/>
            <string key="piServicePortNumber" value="$piServicePortNumber$"/>
            <string key="ohdGraphgenCentralDir"
value="$ohdGraphgenCentralDir$"/>
            <string key="baseOutputDir" value="$HEFS_PRODUCTS_DIR$"/>
            <string key="products.CBNK1" value="AHPS.*"/>
            <string key="products.BLKO2" value="AHPS.*"/>
          </properties>
        </exportRunFileActivity>
      </exportActivities>
      <executeActivities>
        <executeActivity>
          <command>

<className>ohd.hseb.graphgen.adapter.GraphGenModelAdapter</className>
            <binDir>$OHDBINDIR$</binDir>
          </command>
          <arguments>
            <argument>%ROOT_DIR%/run_info.xml</argument>
          </arguments>
          <timeOut>300000</timeOut>
        </executeActivity>
      </executeActivities>
    </activities>
</generalAdapterRun>
```

3.1.2 Add New File: GraphGen_Create_Products.xml

Action: If it does not already exist, create the directory

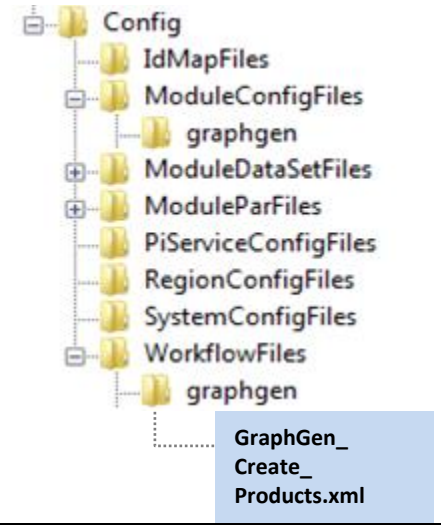
<*configuration_dir*>/WorkflowFiles/graphgen

Open an editor to create the following file under that directory:

GraphGen_Create_Products.xml.

Copy the entire contents of the example below to the file.

Description: The workflow must execute the module added in the previous step to create the needed products, specifically GraphGen_AHPS_Products:

Standard Location: <*configuration_dir*>**/WorkflowFiles/graphgen/**	**Contents:** ***GraphGen_Create_Products.xml***
<region_dir>  	<?xml version="1.0" encoding="UTF-8"?> <workflow xmlns="http://www.wldelft.nl/fews" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.wldelft.nl/fews http://chps1/schemas/workflow.xsd" version="1.1"> <activity> <runIndependent>true</runIndependent> <moduleInstanceId>GraphGen_AHPS_Products</moduleInstanceId> </activity> </workflow>

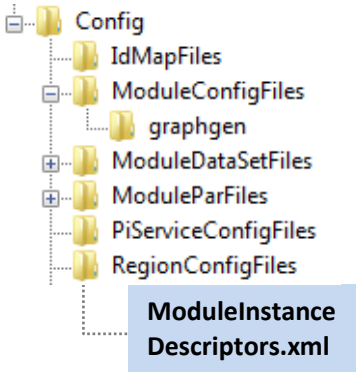
3.1.3 Modify Existing File: ModuleInstanceDescriptors.xml

Action: Modify the file

<*configuration_dir*>/RegionConfigFiles/ModuleInstanceDescriptors.xml

appropriately for the module created above.

Description: Modified to add modules to generate Graphics Generator products. The example below is for the module defined as an example above to generate AHPS products.

Standard Location: <*configuration_dir*>**/RegionConfigFiles/**	**Contents:** ***ModuleInstanceDescriptors.xml***
<region_dir> 	<?xml version="1.0" encoding="UTF-8"?> <moduleInstanceDescriptor xmlns="http://www.wldelft.nl/fews" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.wldelft.nl/fews http://chps1/schemas/moduleInstanceDescriptors.xsd" version="1.0"> … **<!-- ADDED FOR GRAPHGEN -->** **<moduleInstanceGroup id="GraphicsGenerator">** **<moduleInstanceDescriptor id="GraphGen_AHPS_Products">** **<moduleId>GeneralAdapter</moduleId>** **</moduleInstanceDescriptor>** **</moduleInstanceGroup>** **<!-- END -->** …

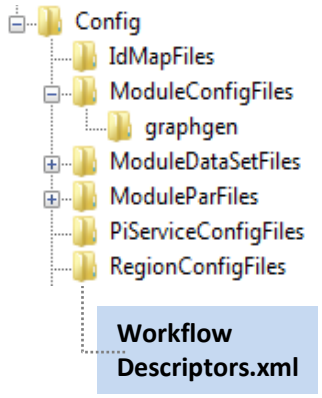
3.1.4 Modify Existing File: WorkflowDescriptors.xml

Action: Modify the file

<*configuration_dir*>/RegionConfigFiles/WorkflowDescriptors.xml

appropriately for the workflow created above.

Description: Modified to add workflows to generate Graphics Generator products. The example below is for the workflow defined as an example above to generate AHPS products.

Standard Location: <*configuration_dir*>**/RegionConfigFiles/**	**Contents:** ***WorkflowDescriptors.xml***
<region_dir>  	<?xml version="1.0" encoding="UTF-8"?> <workflowDescriptors xmlns="http://www.wldelft.nl/fews" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://www.wldelft.nl/fews http://chps1/schemas/workflowDescriptors.xsd" version="1.0"> **…** **<!-- ADDED FOR GRAPHGEN -->** **<workflowDescriptor id="GraphGen_Create_Products"** **name="GraphGen Create Products" forecast="true" visible="true">** **<description>Create GraphGen Products</description>** **</workflowDescriptor>** **<!-- END -->** **…**

3.2 *Test the Changes*

Action: Execute the workflow created above via the CHPS interface **Manual Forecast Panel** as normal (start CHPS, set the PI-service port number, open the panel, show all workflows, select the workflow, and click **Run**). If executed successfully, the AHPS products will be created in the standard location specified by the baseOutputDir run file property (see Section 3.1.1).

If not successful, examine the **Logs Panel** of the CHPS interface and check the trouble shooting section here (Section 6) and in the *Graphics Generator Tips and Troubleshooting Guide*.

4 Synchronizing Changes to the Central Server

Synchronize (upload) the changes made to the configuration and Graphics Generator products and settings to the central area file. General instructions are provided in the *Graphics Generator Installation Guide*.

4.1 *Synchronize Configuration Changes (Required)*

Action: Upload configuration changes to the central area file. Use the FEWS configuration manager (cm) tool for installing the files in the central area file (place the changes in the FEWS OC, and synchronize/upload the changes).

Description: Five configuration files potentially have been modified (Sections 2.1.1, 2.1.2, 2.1.3, 3.1.3, 3.1.4) and two configuration files are new (Sections 3.1.1, 3.1.2).

After making changes to the FEWS OC, you can repeat Section 2.4 to verify that the AHPS product templates are installed correctly in the OC. Start the OC and proceed to Step 1 in that Section.

4.2 *Synchronize Product Changes (Required)*

Action: Upload Graphics Generator product templates and settings to the central area file. See Section 4 of the *Graphics Generator Installation Guide* for instructions on uploading Graphics Generator templates and settings to the central area file.

5 Creating the Scheduled Task

In order to generate the AHPS product output (image files and ASCII tabular files), a scheduled task must be added. Perform the following action to do so:

Action: Create a scheduled task to execute the workflow GraphGen_Create_Products. Use the FEWS admin interface provided by CHPS to schedule the workflow to execute at an appropriate time. Make sure the workflow is executed after the ensemble workflows that yield the time series are completed and with a system time that matches those forecasts.

6 Trouble Shooting

For general trouble shooting tip, see the *Graphics Generator Tips and Troubleshooting Guide*.

6.1 *Time Series Cannot Be Acquired via the PI-service*

Not being able to load time series via the FEWS PI-service within Graphics Generator may be due to the locationId of the time series output by the FEWS PI-service not being the same as the segment id. If that is the case, then the id-mapping may need to be corrected; see Section 2.1.2. However, in some cases, it may be preferable to change the default predefined argument defaultLocationId for the problematic segments; see Section 6.1.1.

If that the locationId is not the problem, see Section 3.1 of the *Graphics Generator Tips and Troubleshooting Guide*.

See Section 2.5 of the *Graphics Generator Tips and Troubleshooting Guide* for how to check the return of FEWS PI-service queries.

6.1.1 Changing the Default Location Id for AHPS Product Templates

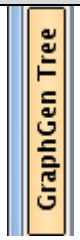
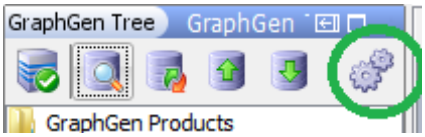
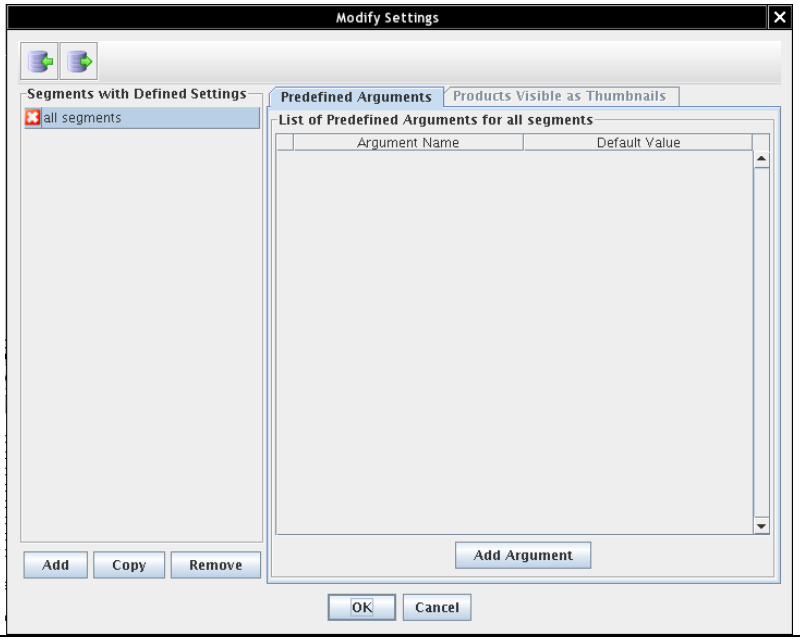
The AHPS product templates for which installation instruction are provided make use of a default predefined argument with the name defaultLocationId to identify the locationId for which to load and display ensemble data. By default, that id is set to the active forecast segment id. It may be necessary to change the defaultLocationId if the following is true:

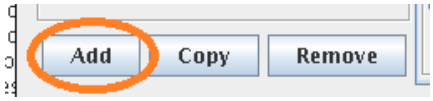
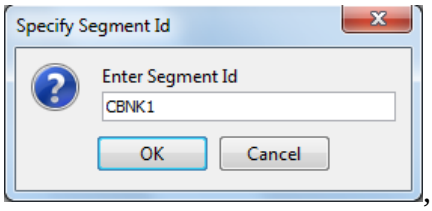
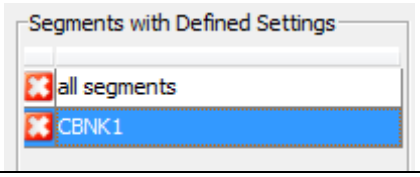
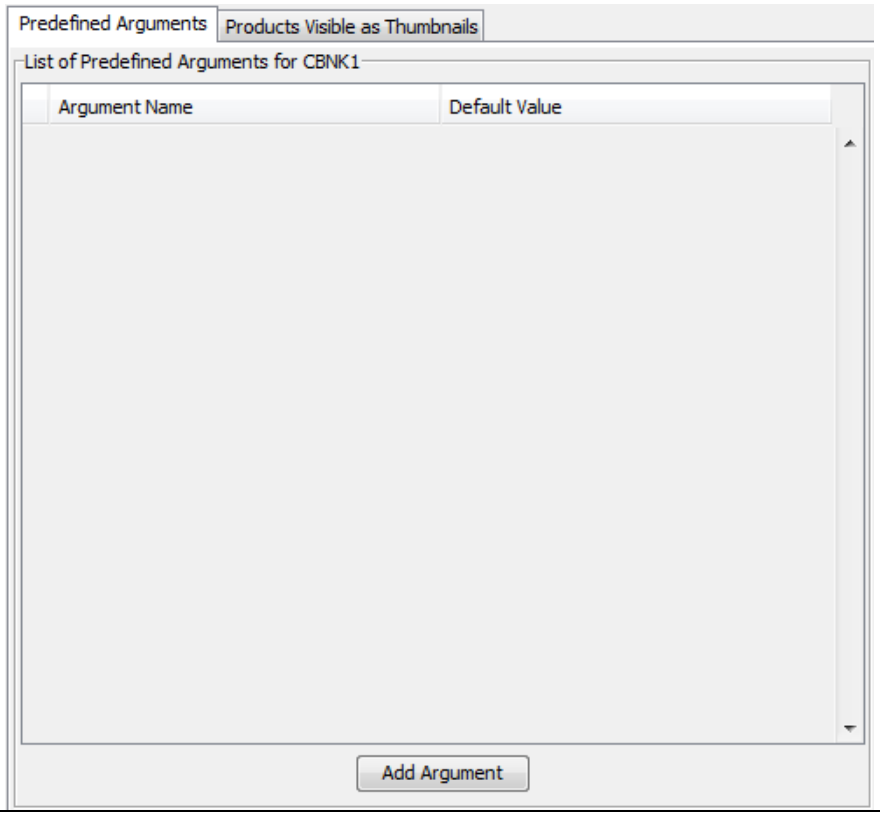
- *All of the time series returned by the PI-service always have the same* locationId*, but that* locationId *does not match the segment id.*

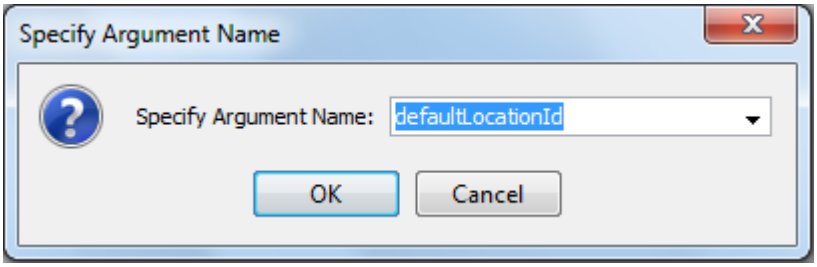
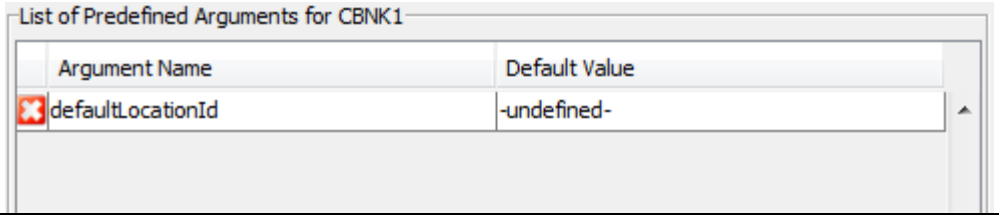
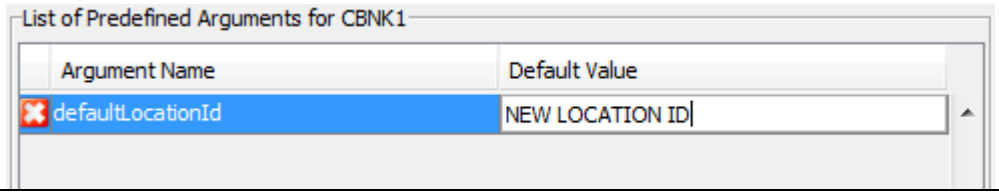
It is possible to resolve this problem by defining an id-mapping (see Section 2.1.2), but it may be preferable to change the defaultLocationId via Graphics Generator components instead.

For example, for CNRFC, segment ids tend to be identical to the location ids but with one extra letter, so the time series for segment id DOSC1H use locationId DOSC1, while those for FTSC1L use locationId FTSC1. In such a case, and assuming all of the needed time series returned by the PI-service use the same locationId, the defaultLocationId for segments DOSC1H and FTSC1H can be overridden and set to DOSC1 and FTSC1, respectively, rather than using an id-mapping.

Below are provided instructions for modifying the defaultLocationId for a segment.

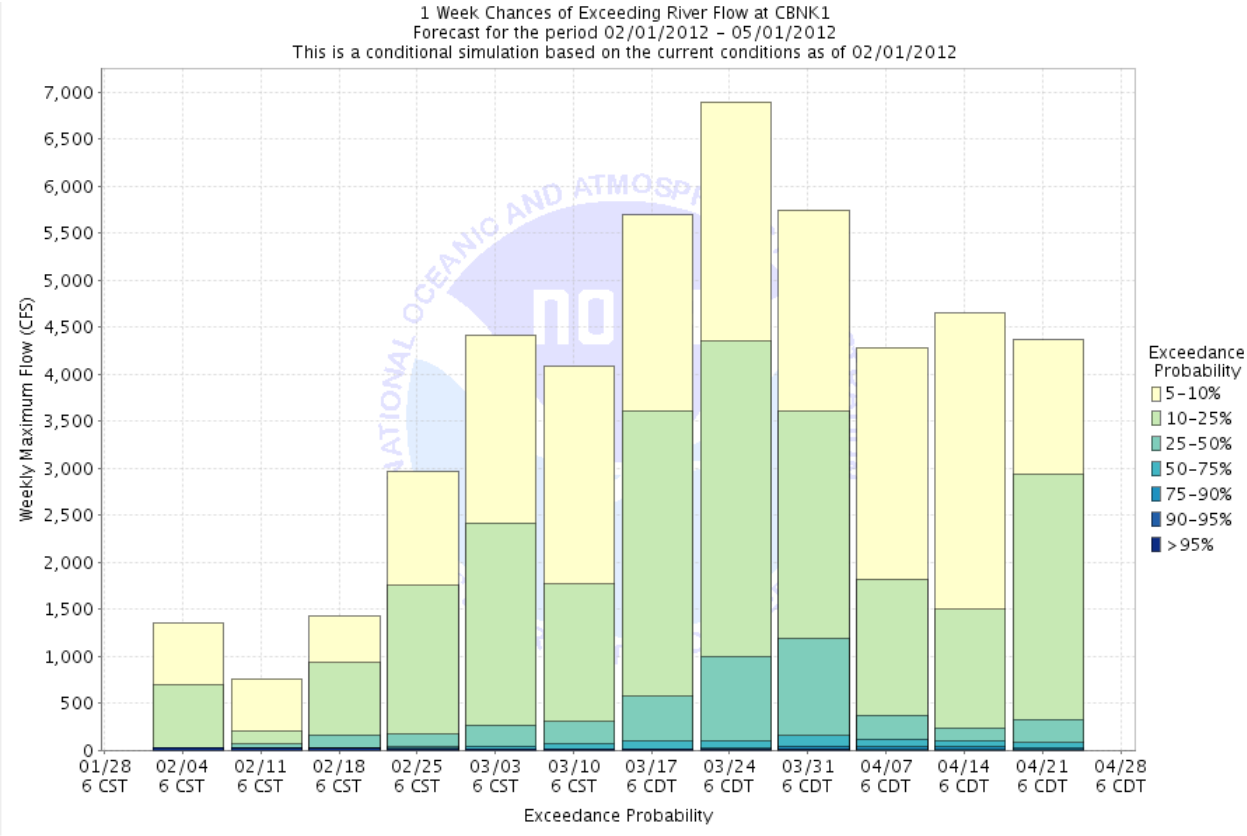
#	Action
1	Click on the  (tab) on the left to open the **GraphGen Tree Panel**.
2	Click on the **Change Default Settings Button**,  , in the toolbar of the **GraphGen Tree Panel**:  The **Modify Settings Dialog** will open (the exact appearance of this panel will vary based on what settings have already been modified): 

#	Action
3	If the segment for which to make the change is listed in the **Segments With Defined Settings List**, select the segment by clicking on it. If not, then click on the **Add Button** under the list  When the **Specify Segment Id Dialog** opens,  enter segment id and click **OK**. The segment will appear in the **Segments With Defined Settings List**: 
4	Select the **Predefined Arguments Tab** to make the **Predefined Arguments Panel** active (the exact appearance of this panel will vary based on the predefined arguments already defined for the segment): 

#	Action
5	Click on the **Add Argument Button** at the bottom of the panel. A **Specify Argument Name Dialog** will open: 
6	The defaultLocationId will be selected by default. Click **OK**. The argument will be added to the **List of Predefined Arguments** with an undefined value: 
7	Change the 'Default Value' column for the defaultLocationId to be the locationId of the ensemble of time series returned by the PI-service. To do so, click on the cell, type the new value, and press <Enter>. For example: 
8	Click on the **OK Button** at the button of the **Modify Settings Dialog** to save the changes. If the **GraphGen Thumbnails Panel** is already open for the segment id for which a product was made not visible, then it will be redrawn removing the product's thumbnail.
9	Make the change permanent by clicking on the **Upload Products Button** in the **GraphGen Tree Panel**:  When the confirmation dialog opens, click **Yes**.

6.2 *Thresholds Are Not Displayed In a Product*

This only applies if thresholds are expected to be displayed in a product, but are not. For example, the AHPSFlowHistogram product template should include thresholds, but in this case none are displayed:



After drawing the chart, an info-level "problem" log message similar to the following will be displayed for each threshold that could not be processed:

> [2015-02-02 09:03:46,918] INFO - ExecuteActivity.processDiagnosticFile - Problem processing threshold with identifier 'JNKO2 SQIN FS' (evaluated from '@defaultLocationId@ SQIN @ahpsMinorFloodingThresholdId@') - threshold will be ignored: it is incomplete; perhaps it is an override threshold with no corresponding default.

If the product template is processed through the **GraphGen Editor Panel**, a warn-level message similar to the following will be then displayed after **Full Chart Display Panel** is updated:

> [2015-02-02 14:32:56,953] WARN - GraphGenEditorExplorerPlugIn.refreshFullChart - Problems were encountered processing thresholds while updating the Full Chart Display Panel; look at preceding log messages that start with "Problem processing threshold with identifier".

If the product template is processed through the GraphGenModelAdapter, then a warning for the segment for which the product was generated will be displayed summarizing all threshold problems for that segment; for example:

[2015-02-02 09:03:46,925] WARN - ExecuteActivity.processDiagnosticFile - GA.Execution.Model.Warn: In adapter model: Issues were encountered processing thresholds for segment JNKO2 and the following templates (look above for messages starting with, "Problem processing threshold with identifier"): AHPSFlowHistogramFiveValues, AHPSFlowProbPlot, AHPSFlowSpaghetti, AHPSStageSpaghetti

The problem is likely due to one of three causes:

1. The threshold arguments ahpsMinorFloodingThresholdId, ahpsModerateFloodingThresholdId, and ahpsMajorFloodingThresholdId, are not properly defined via the **Modify Settings Dialog** accessible via the **GraphGen Tree Panel**. See Section 2.3 for how to define those settings.
2. No thresholds exist in the ThresholdValueSets.xml configuration file for the segment. The solution is to add the necessary thresholds to that file.
3. Thresholds exist in the ThresholdValueSets.xml configuration file, but are not associated with time series used in the product. Specifically, the time series returned by the queries "QINE ESP" and "SSTG ESP" and the time series that are included specifically to acquire the thresholds, "QINE" and "SSTG" (see Section 2.1.1). There are two solutions in this case:
    a. (This solution requires a significant amount of work when done for all segments.) Add the time series referred to in the product template as timeSeriesSet XML elements to the thresholdValueSet associated with the segment. It is expected that the queries QINE and SSTG defined in GraphGen.xml return time series that include the thresholds; see Section 2.1.1.
    b. (This solution requires experience with the **GraphGen Editor Panel** and is already being done for the AHPS products. Hence, this solution would require using a different time series.) Add an input series provider to the product that provides input series with which the thresholds are associated. This is done via the **Input Series Panel** of the **GraphGen Editor Panel**; be sure to check the **Include Thresholds Checkbox**. For example, a provider may be added that yields single-value (non-ensemble) QIN time series, which often have thresholds defined, to the ESP products. However, be sure to modify the rest of the product definition appropriately to ensure that the added time series is not used in the product computations. For example, you may need to modify the time series selection defined in the **Chart Series Panel** to exclude the single-valued time series.

Option b has already been applied in the AHPS product templates as described above, using time series returned by the QINE and SSTG queries defined in the GraphGen.xml PI-service configuration file.

6.2.1 Removing Thresholds from AHPS Products

The AHPS product templates for which installation instructions are provided are designed to display minor, moderate, and major flooding thresholds. For segments for which on or more of these thresholds are not defined, AHPS product chart images should still appear reasonable, but will not include the undefined thresholds. This is true if all the thresholds do not exist or any two of the thresholds are missing. It is also true if either the minor or major thresholds are missing, but the other two are specified.

However, the one case where the product chart images will not appear correct is if the moderate flooding threshold is missing and the product viewed is a probability plot product wherein the thresholds are displayed as zones (i.e., filled in areas). In such a case, the minor threshold zone will be assumed unbounded above and will be displayed below the major threshold zone, resulting in the mixing of those two colors. The fix requires creating a specialized version of the AHPS probability plot products wherein the moderate threshold is not included.

Instructions are provided below for two things:

1. General instructions for removing a threshold.
2. Specific instructions for removing the moderate threshold and creating a new probability plot product.

Prior to performing the steps, the user must do the following:

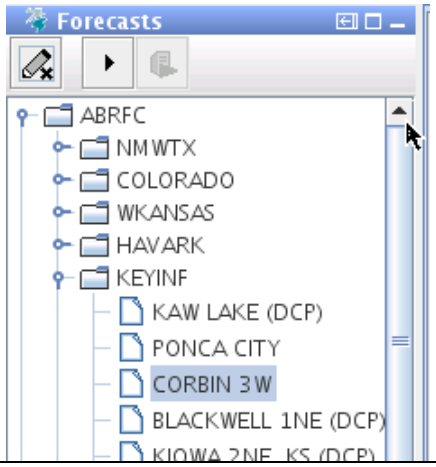
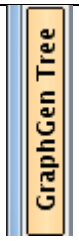
- Identify a segment for which the products can be displayed that does not include the needed threshold.
- Start CHPS.

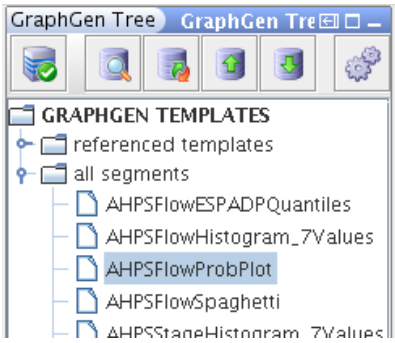
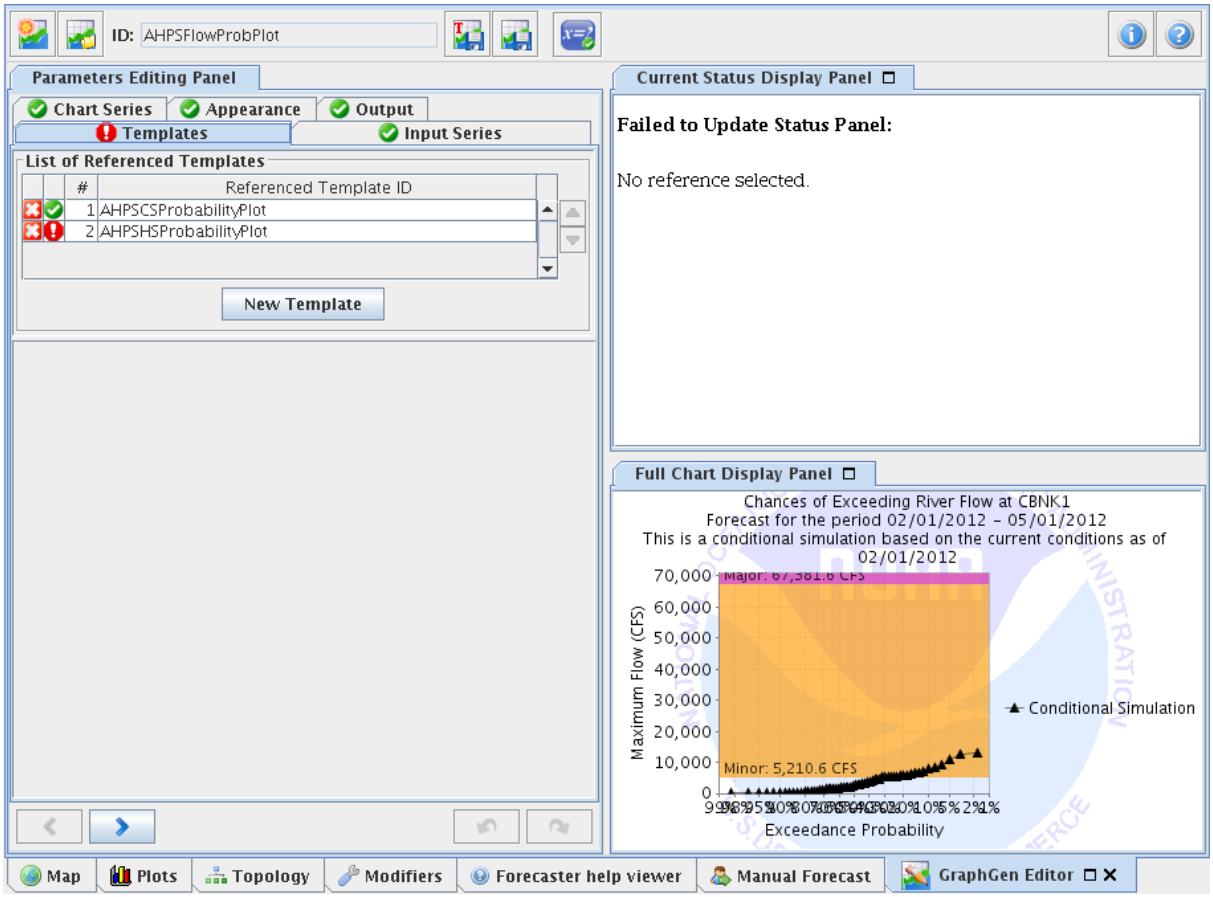
If a threshold included in a product is not defined, the threshold will not be included in the chart and Graphics Generator will output a warning message similar to the following:

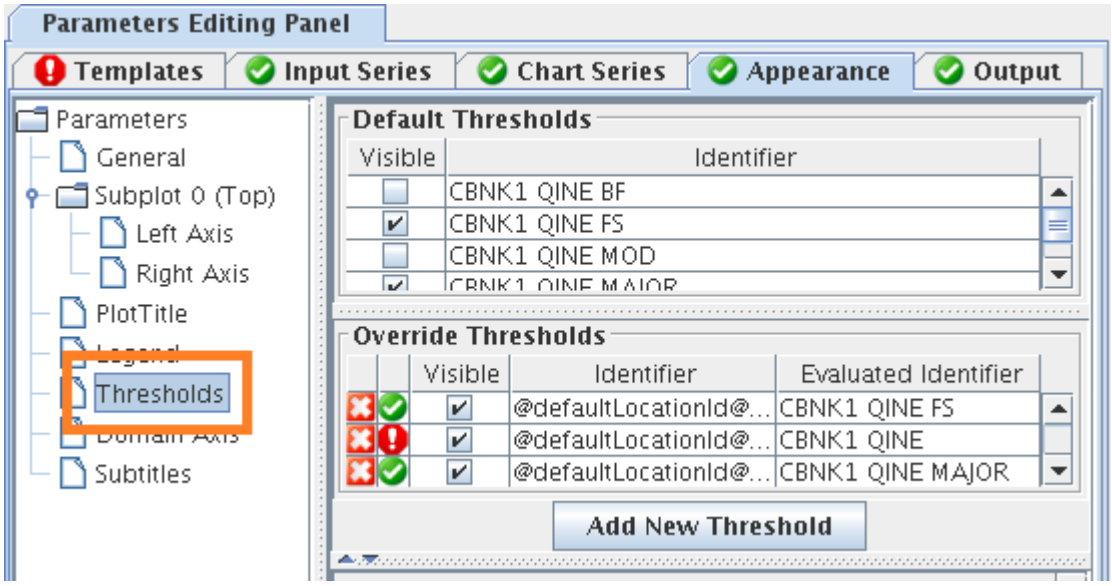
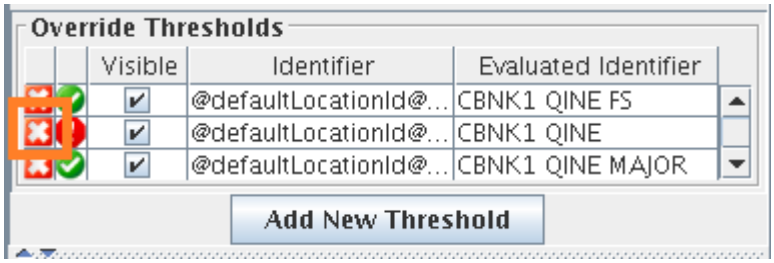
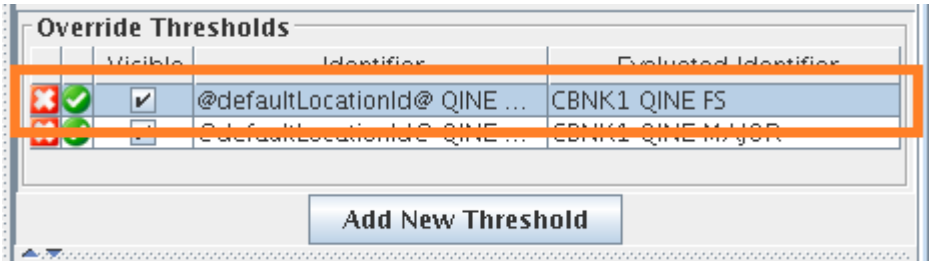
> Threshold with identifier '@defaultLocationId@ QINE @ahpsMinorFloodingThresholdId@' is incomplete and will be ignored. Perhaps it is an override threshold with no corresponding default.

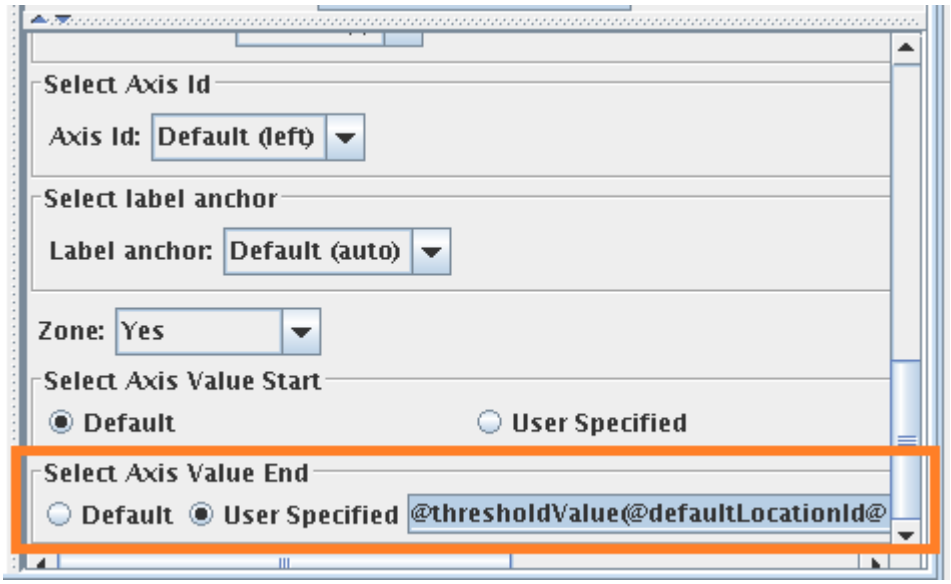
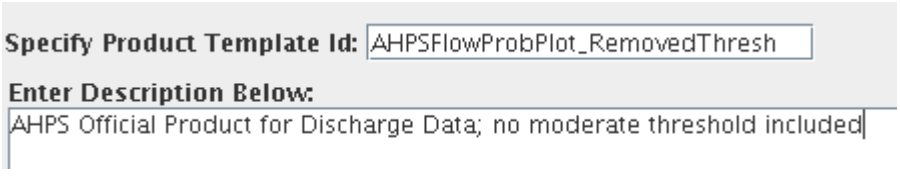
This is expected and the messages can be ignored.

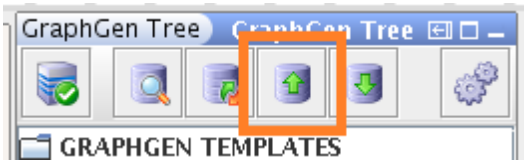
#	Action

#	Action
1	Click on the  (tab) on the left to open the **Forecasts Panel**.
2	If not already in view mode, click on the **View Mode Button** to switch to view mode; the button will change after clicking as follows: 
3	Select a segment for which the required ensemble should be in the localDataStore. For example, for ABRFC, the segment KIOK1 is used: 
4	Click on the  (tab) on the left to open the **GraphGen Tree Panel**.

#	Action
5	Select the product template that will be modified to create a version without thresholds. For example: 
6	Click on the **GraphGen Editor Button** to open the **GraphGen Editor Panel** (note the moderate flooding threshold is not defined): 

#	Action
7	In the **Paramters Editing Panel**, click on the **Appearance Tab** to make the **Appearance Panel** active, and select "Thresholds" from the **Tree** on the left:  Note that the status icon for the middle threshold is  , indicating the threshold is undefined.
8	Delete the undefined threshold by clicking on the  : 
9	Select the first row in the **Override Thresholds Table** (defining the minor flooding threshold).  The **Threshold Parameters Panel** below the table will change, displaying the parameters of the threshold and allowing for its modification.

#	Action
10	In the **Threshold Parameters Panel**, scroll down to the **Select Axis Value End Field** and modify its value to be the following: @thresholdValue(@defaultLocationId@ QINE @ahpsMajorFloodingThresholdId@;1)@  Upon making this change, the color for the major flooding threshold zone will change. Here is its appearance before the change:  Here it is after:  This minor change is because the minor flooding threshold is now bounded above by the major threshold. Before this change, it was bounded above by the moderate threshold which was undefined, so that it treated it as unbounded.
11	Click on the **Save as Product Template Button** in the toolbar of the **GraphGen Editor Panel** and when the **Save Product Template Dialog** opens, modify the **Specify Product Id Field** and **Description Field** to indicate that the product does not include the moderate threshold; for example: 

#	Action
12	Click on **Save** in the dialog  and close the **GraphGen Edit Panel** by clicking on the 'X' in the **GraphGen Editor Tab** at the bottom of the panel: 
13	Following steps described in Section 2.6 of the *Graphics Generator Tips and Troubleshooting Guide*, set the visibility within the **GraphGen Thumbnails Panel** for the original product and product without thresholds as follows: • For 'all segments', the visibility of the product without the threshold subtitle should be set to 'No', so that, by default, the product is not displayed a as a thumbnail. • For each segment for which the no-threshold product must be displayed, set the visibility of the original product to be 'No' and the visibility of the product without thresholds to be 'Yes'. With these settings, the original product will be displayed for all segments, by default, but will not be visible for segments for which thresholds are not defined, whereas the product without the threshold subtitle will only be visible for such segments.
14	Make the change permanent by clicking on the **Upload Products Button** in the **GraphGen Tree Panel**:  When the confirmation dialog opens, click **Yes**.

6.3 *AHPS Probability Plots Cannot Be Displayed*

The AHPS probability plots require an aggregation spanning the entire period of the AHPS products; by default 90 days. If any one of the 90-days of values required to perform the aggregation is missing for any member of the ensemble, the ensemble will fail to aggregate. Hence, no data will be available to compute the probability plot and an error will be generated (visible in the CHPS **Logs Panel** and the adapter run diag.xml file):

```
INFO - For segment 'ASEN6HUD', generating product 'AHPSStageProbPlot'...
INFO - Preparing chart...
WARN - In ProbabilityPlot calculator, the computation date Fri Sep 20 12:00:00 GMT 2013 yielded an empty
    distribution/exceedance function; it may be outside the start/end time of the data.
WARN - Chart series #0 was calculated but is empty.
WARN - In ProbabilityPlot calculator, the computation date Fri Sep 20 12:00:00 GMT 2013 yielded an empty
    distribution/exceedance function; it may be outside the start/end time of the data.
WARN - Chart series #1 was calculated but is empty.
ERROR - Unable to prepare chart for production: No chart series were created.  Cannot create empty chart.
```

Note that there were two warning indicating that both chart series #0 (which computes the conditional simulation 'ESP' probability plot) and chart series #1 (which computes the historical simulation 'HS' proabability plot) were empty. This means no chart series were created, leading to the last error message.

The fix to this problem can be one of the following:

- If the ensembles used to compute the probability plot do not use the default ensembleIds 'ESP' and 'HS', correct the products to refer to the correct ensembleIds. See Section 6.3.1.
- If product forecast horizon is too long relative to the forecast ensemble, reduce it. See Section 2.2 on how to modify the forecast horizon and Section 2.3 on how to import the products, again.
- If the forecast horizon of the ensembles is exactly 90 days, this may mean that the probability plot products were created for a system time (T0) after that for which the forecast ensembles were created. Use CHPS tools, such as the **Database Viewer** and **Workflow Navigator**, to identify if this was the problem. If so, then set the system time correctly when generating the probability plot. This may require modifying a scheduled task.
- If the 90 day aggregation period is covered by the forecast ensemble, then the problem may be due to missing data in the ensemble members or perhaps members output via the PI-service were all missing or not generated. Again, use CHPS tools, such as the **Database Viewer** and **Workflow Navigator** to identify if this is the case. You can also use the **GraphGen Editor Panel** to view the time series acquired via the PI-service; see Section 2.5 of the *Graphics Generator Tips and Troubleshooting Guide*.

If the solution still cannot be found, report the issue as a bug. Debugging the issue requires a valid localDataStore, so you should create a copy of the localDataStore that yielded the problems.

6.3.1 Changing the Ensemble Ids Used in AHPS Products

The AHPS products for which installation instructions are provided are designed to display series computed using all ensemble members provided. The exception to this are the probability plot product templates (AHPSFlowProbPlot, AHPSStageProbPlot, and AHPSVolumeProbPlot) which are capable of displaying results for multiple ensembles. Specifically, it can display two probability plots:

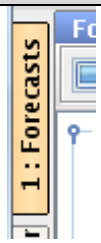
- A conditional simulation generated ensemble, assumed to have ensembleId 'ESP'
- A historical simulation generated ensemble, assumed to have ensembleId 'HS'

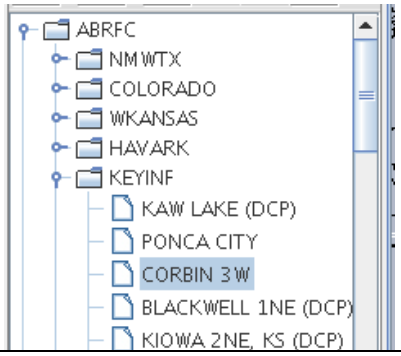
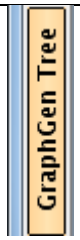
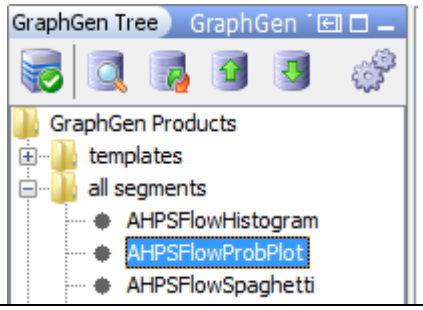
If either ensembleId assumption is wrong, then the probability plot products must be modified to change which ensembleId is used. Instructions to do so are provided below.

Prior to performing the steps, the user must do the following:

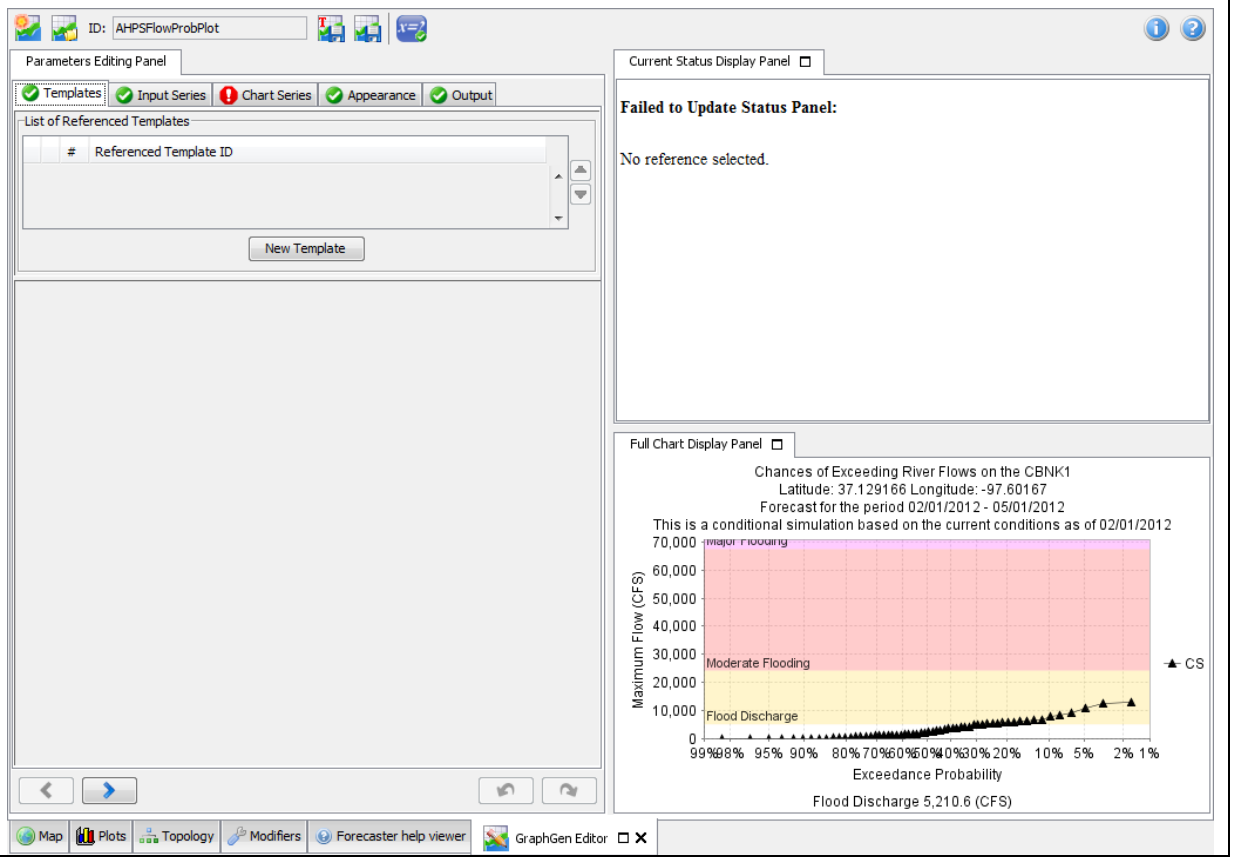
- Identify a segment for which the products can be displayed.
- Identify which of the two ensembleIds must be modified and identify the appropriate ensembleId value.
- Start CHPS.

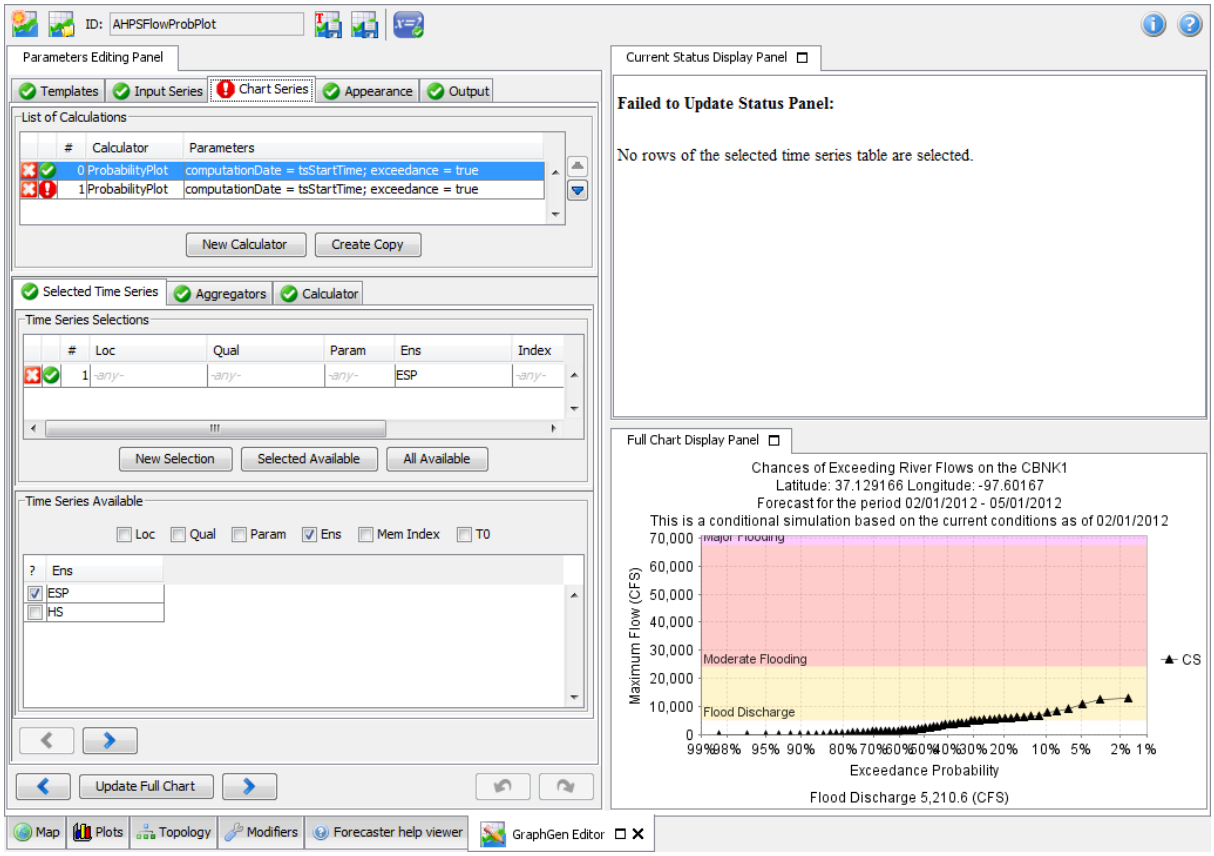
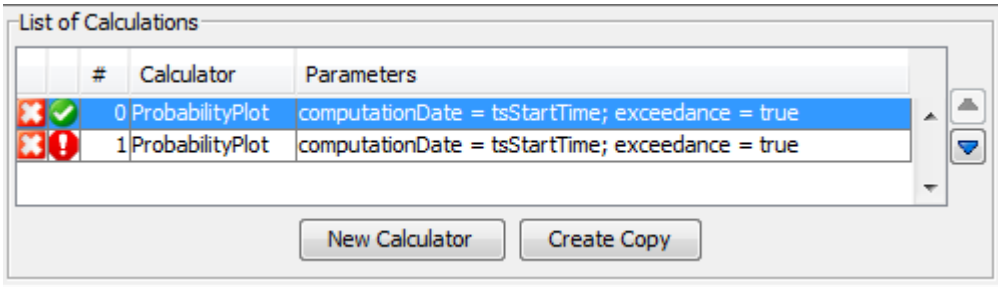
The example used in the instructions requires modifying the ensembleId 'ESP' to 'EPP3'. It is also provided assuming that the queries defined in the PI-service configuration file GraphGen.xml are correctly defined to acquire the appropriate ensemble.

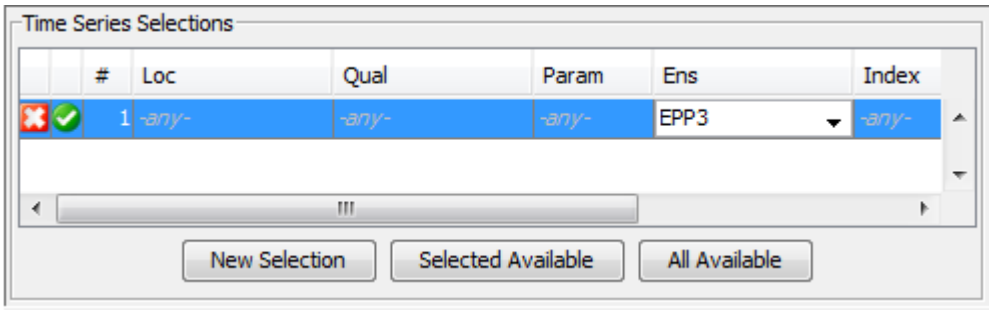
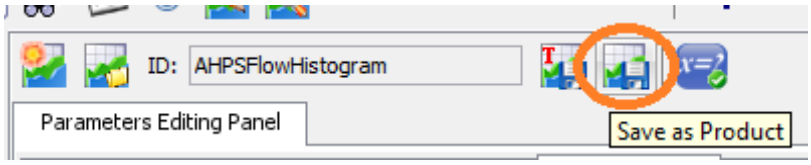
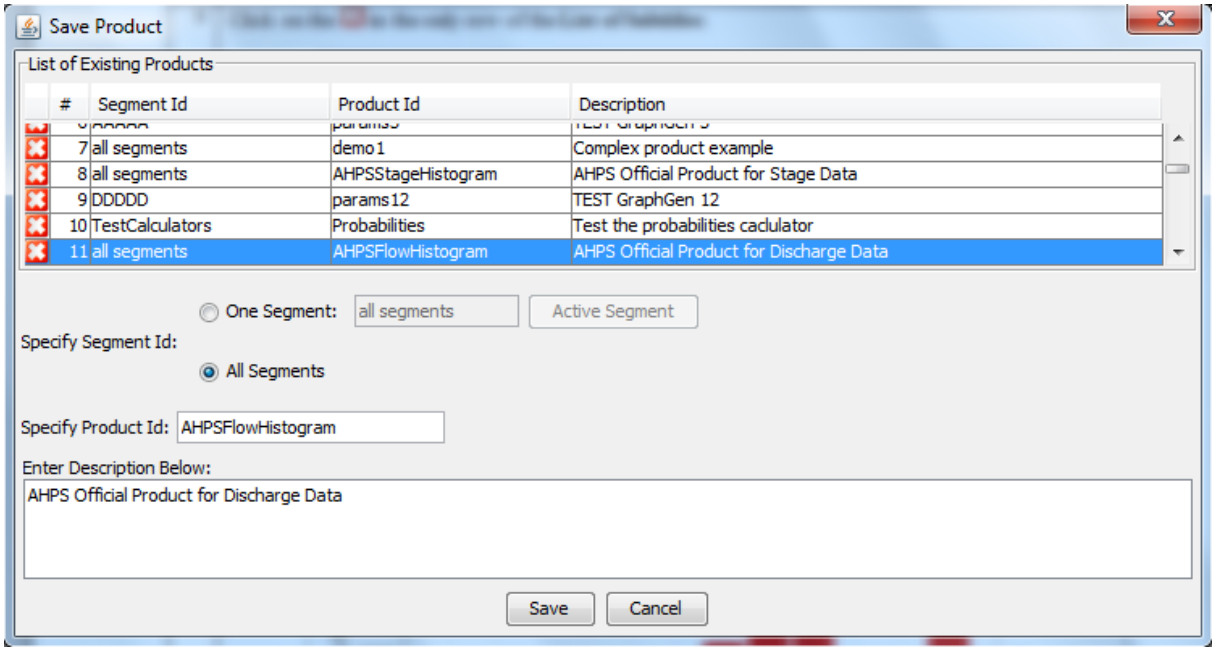
#	Action
1	Click on the  (tab) on the left to open the **Forecasts Panel**.

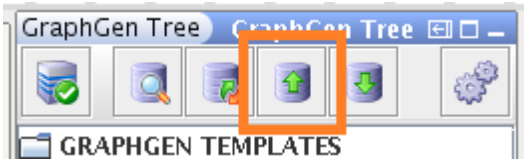
#	Action
2	If not already in view mode, click on the **View Mode Button** to switch to view mode; the button will change after clicking as follows: 
3	Select a segment for which the required ensemble should be in the localDataStore. For example, for ABRFC, the segment CBNK1 is used: 
4	Click on the  (tab) on the left to open the **GraphGen Tree Panel**.
5	Select the probability plot product template to modify. For example: 

#	Action
6	Click on the **GraphGen Editor Button** to open the **GraphGen Editor Panel**:



#	Action
7	In the **Paramters Editing Panel**, click on the **Chart Series Tab** to make the **Chart Series Panel** active: 
8	In the **List of Calculations** at the top, select the row for the chart series to be modified: • If the ensembleId ‘ESP’ (conditional simulation ensemble) is to be changed, select the first row • If the ensembleId ‘HS’ (historical simulation ensemble) is to be changed, select the second row For this example, the ensembleId ‘ESP’ will be modified to ‘EPP3’, so select the first row: 

#	Action
9	In the only row of the **Time Series Selections Table**, modify the value for column 'Ens' to be the correct ensembleId, 'EPP3', by clicking on the appropriate cell, typing in the new value, and pressing <Enter>:  Note that the **Current Status Display Panel** in the upper left of the **GraphGen Editor Panel** will update immediately to display the loaded time series. The **Full Chart Display Panel** will not update immediately.
10	Click on the **Update Full Chart Button** to display the new product in the **Full Chart Display Panel** in the lower right of the **GraphGen Editor Panel**. Confirm that it appears reasonable.
11	Click on the **Save as Product Button** in the toolbar:  A **Save Product Dialog** will open: 

#	Action
12	Click on **Save** to save the product without any name change,  and close the **GraphGen Edit Panel** by clicking on the 'X' in the **GraphGen Editor Tab** at the bottom of the panel: 
13	Upload the change by clicking on the **Upload Products Button** in the **GraphGen Tree Panel**:  When the confirmation dialog opens, click **Yes**.

6.4 *Other Plots Cannot Be Displayed*

For AHPS probability plots, see Section 6.3. For all other plots, if the plot cannot be displayed, it is likely due to one of the following reasons:

- The data required is not available in the local data store. Use the CHPS **Database Viewer** to verify that the time series are available.
- If the time series come from a forecast workflow, then the forecast workflow was not approved. Use the CHPS **Database Viewer** to verify if the forecasts were approved. The FEWS PI-service is only capable of acquiring forecast time series if the forecast workflow output was approved.
- The FEWS PI-service queries are incorrectly defined. See Section 2.5 of the *Graphics Generator Tips and Troubleshooting Guide* for how to use the **GraphGen Editor Panel** to check a PI-service query.

If the solution still cannot be found, report the issue as a bug. Debugging the issue requires a valid localDataStore, so you should create a copy of the localDataStore that yielded the problems.